

August, 2024

M/s AIC Iron Industries Pvt. Ltd.

ENVIRONMENTAL IMPACT ASSESSMENT

For

Proposed expansion of existing steel plant by installation of 1X0.5 MTPA capacity Sinter Plant, 1X500 M³ capacity MBF, 3x650 TPD DRI Kilns, 6x25 T Induction Furnaces, 1x25 T Electric Arc Furnaces along with 1x15 TPH Slag Crusher unit, Enhancement (through optimization in operation) of the production capacity of 4x15 T + 2X10 T Induction Furnaces (as per EC 2010 & 2023), 3x12 MVA capacity Submerged Arc Furnaces, 1x0.3 MTPA capacity Rolling Mill, Lime Plant (250 TPD), Oxygen Plant (225 TPD), 1x0.5 MTPA capacity Ductile Iron Pipe (DIP) Plant, 60,000 TPA capacity Galvanising Unit along with 4x4000 Nm³/Hr capacity Producer Gas Plant and 100 MW capacity Captive Power Plant (70 MW WHRB + 30 MW AFBC/CFBC)

At

Village Benipur; P.O.: Saltor, P.S.: Neturia,
Dist: Purulia, West Bengal



Envirotech East Pvt. Limited

An ISO 9001:2015, ISO 14001:2015 & ISO 45001:2018 Certified Company

Laboratory Recognised by Ministry of Environment, Forest & Climate Change, Govt. of India

Accredited by NABET, Quality Council of India as an EIA Consultant

NABET Certificate No.: NABET/EIA/2225/RA 0279.

Baseline Monitoring Period: 1st March, 2023 to 31st May, 2023

Corporate Office: 100 Kalikapur, Madurdaha, Kolkata-700107, West Bengal

Phone: 033-24438127/28, Fax: 033-24438128

Email: eeplkol@gmail.com, eeplkol2@gmail.com, md.eeplkol@gmail.com

Website: www.envirotecheast.com



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- Laboratory Recognized by WBPCB
- Accredited EIA Consultant by QCI-NABET



100, Kalikapur, Madurdaha, Kolkata – 700 107, West Bengal, India

☎ – + 91 33 2443 8127/8128 ; + 91 33 4063 5011; email: eeplkol@gmail.com; eeplkol2@gmail.com

CIN NO : U74210WB1989PTC047403

Date: 17th July, 2024

TO WHOM IT MAY CONCERN

Subject: Environmental Impact Assessment for Proposed expansion of existing steel plant by installation of 1X0.5 MTPA capacity Sinter Plant, 1X500 M3 capacity MBF, 3x650 TPD DRI Kilns, 6x25 T Induction Furnaces, 1x25 T Electric Arc Furnaces along with 1x15 TPH Slag Crusher unit, Enhancement (through optimization in operation) of the production capacity of 4x15 T + 2X10 T Induction Furnaces (as per EC 2010 & 2023), 3x12 MVA capacity Submerged Arc Furnaces, 1x0.3 MTPA capacity Rolling Mill, Lime Plant (250 TPD), Oxygen Plant (225 TPD), 1x0.5 MTPA capacity Ductile Iron Pipe (DIP) Plant, 60,000 TPA capacity Galvanising Unit along with 4x4000 Nm³/Hr capacity Producer Gas Plant and 100 MW capacity Captive Power Plant (70 MW WHRB + 30 MW AFBC/CFBC) at village Benipur; P.O.: Saltor, P.S.: Neturia, Dist: Purulia, West Bengal

MoEF&CC File No. J-11011/566/2008-IA-II(I)

We do hereby declare that we, **M/s Envirotech East Pvt. Ltd.** have undertaken the Environmental Impact Assessment Study for the subject job, as per the EIA Notification, 2006 and in compliance with the finalized Terms of Reference, issued by Ministry of Environment, Forest & Climate Change (MoEF&CC), Govt. of India vide its letter (**File No. J-11011/566/2008-IA-II(I)**) dated 10th June, 2024. The prescribed TORs have been complied with and that the data submitted is factually correct.

Thanking you,

Yours faithfully,
For **Envirotech East Pvt. Ltd.**



(Asoke Kumar Banerjee)
Director

AIC Iron Industries Pvt. Ltd.

25, GANESH CHANDRA AVENUE, 4TH FLOOR, KOLKATA - 700 013
Tel. No. : +91 - 33 - 2221 7535 / 36 • Fax No. : +91 - 33 - 2211 4567
E-mail : aic_iron@aicsteel.in • CIN : U27109WB2003PTC097420



Date: 17th July, 2024

TO WHOM IT MAY CONCERN

Subject: Environmental Impact Assessment for Proposed expansion of existing steel plant by installation of 1X0.5 MTPA capacity Sinter Plant, 1X500 M3 capacity MBF, 3x650 TPD DRI Kilns, 6x25 T Induction Furnaces, 1x25 T Electric Arc Furnaces along with 1x15 TPH Slag Crusher unit, Enhancement (through optimization in operation) of the production capacity of 4x15 T + 2X10 T Induction Furnaces (as per EC 2010 & 2023), 3x12 MVA capacity Submerged Arc Furnaces, 1x0.3 MTPA capacity Rolling Mill, Lime Plant (250 TPD), Oxygen Plant (225 TPD), 1x0.5 MTPA capacity Ductile Iron Pipe (DIP) Plant, 60,000 TPA capacity Galvanising Unit along with 4x4000 Nm³/Hr capacity Producer Gas Plant and 100 MW capacity Captive Power Plant (70 MW WHRB + 30 MW AFBC/CFBC) at village Benipur; P.O.: Saltor, P.S.: Neturia, Dist: Purulia, West Bengal

MoEF&CC File No. J-11011/566/2008-IA-II(I)

This is to certify that we, **M/s AIC Iron Industries Pvt. Limited** have gone through the entire Environmental Impact Assessment report, prepared as per the EIA Notification, 2006 and in compliance with the finalized Terms of Reference, issued by Ministry of Environment, Forest & Climate Change, Govt. of India vide its letter (**File No. J-11011/566/2008-IA-II (I)**)) dated -- 10th June, 2024 for the above mentioned project. The Information/data as given by M/s Envirotech East Pvt. Ltd., Kolkata in the EIA report has been checked at our end and is found to be factually correct in all respect.

for M/s AIC Iron Industries Pvt. Ltd.

Dinesh Adukia
Director

Envirotech East Pvt. Limited

An ISO 9001:2015, ISO 14001:2015 & ISO 45001:2018 Certified Company

- Laboratory Accredited by NABL, as per ISO/IEC 17025:2017
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☎ – + 91 33 2443 8127/8128 ; + 91 33 4063 5011; email: eeplkol@gmail.com; eeplkol2@gmail.com

CIN NO : U74210WB1989PTC047403

Certificate of Plagiarism Check

Title of EIA Report:	Proposed expansion of existing steel plant by installation of 1X0.5 MTPA capacity Sinter Plant, 1X500 M3 capacity MBF, 3x650 TPD DRI Kilns, 6x25 T Induction Furnaces, 1x25 T Electric Arc Furnaces along with 1x15 TPH Slag Crusher unit, Enhancement (through optimization in operation) of the production capacity of 4x15 T + 2X10 T Induction Furnaces (as per EC 2010 & 2023), 3x12 MVA capacity Submerged Arc Furnaces, 1x0.3 MTPA capacity Rolling Mill, Lime Plant (250 TPD), Oxygen Plant (225 TPD), 1x0.5 MTPA capacity Ductile Iron Pipe (DIP) Plant, 60,000 TPA capacity Galvanising Unit along with 4x4000 Nm ³ /Hr capacity Producer Gas Plant and 100 MW capacity Captive Power Plant (70 MW WHRB + 30 MW AFBC/CFBC) at village Benipur; P.O.: Saltor, P.S.: Neturia, Dist: Purulia, West Bengal by M/s AIC Iron Industries Pvt. Limited.
Name of Accredited Organization:	Envirotech East Pvt. Limited 100, Kalikapur, Madurdaha Kolkata - 700 107
Unique Identification Number:	NABET/EIA/2225/RA 0279
Name of EIA Coordinator (EC):	T. Kundu
Name of the Software:	PlagiarismcheckerX
Date of Check:	19-08-2024
Time of Check:	10:30 AM to 6:30 PM

Declaration by the Head of the accredited consultant organization/ authorized person:

I hereby certify that this EIA Report has been evaluated using licensed software PlagiarismcheckerX. The report produced has been analyzed by the system and based on it, I certify that the EIA report produced in accordance with good scientific practice.

Date: 19-08-2024

Sign of EIA Coordinator:

Name: **T. Kundu**

Designation: Deputy General Manager



Date: 19-08-2024

Sign of Head of Accredited Organization:



(**Asoke Kumar Banerjee**)

Name of the EIA consultant organization: Envirotech East Pvt. Limited

NABET Certificate No.: NABET/EIA/2225/RA 0279

Valid upto 12-09-2025

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FINALISED “TERMS OF REFERENCE” & THEIR REFERENCE IN EIA REPORT			
Sl. No.	Finalised “Terms of Reference”	Reply	Reference in EIA Report
Specific Terms of Reference for (Metallurgical Industries (Ferrous And Non Ferrous) - Annexure-I			
1	PP shall complete the land acquisition and conversion for industrial purpose and submit the credible documents with the EIA/EMP Report.	The proposed project will be installed on the available land within the existing plant area as well as on the additional land adjacent to its existing plant premises comprising of total 30.25 Hectares (74.74 Acres) land. Out of the total land of 30.25 Hectares (74.74 Acres), 20.82 Hectares (51.44 acres) private land are already acquired. The remaining 9.43 Hectares (23.30 acres) is in the process of Acquisition.	Chapter-2.0, Section-2.1
2	There are sensitive areas within the study area of the project site. Proponent shall prepare appropriate environmental safeguard measures to minimise the impact of the project activities on these sensitive areas.	Habitations / Schools / Health Centres / Rivers located in the surrounding areas of the project site. Mitigation measures undertaken to minimise the impacts of the project on Schools / Medical Centres / Habitations: ✓ Air & Water Quality Monitoring ✓ Health Check-up programme. ✓ Plantation at the surrounding in consultation with the respective Department ✓ Water Spray on the roads ✓ Traffic Control in the area ✓ Speed control of all the trucks & other vehicles in the area.	-

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3	There are water bodies are present within the study area of the project site. The PP shall include in the EIA/EMP report suitable steps /conservation plan along with contouring (close intervals), Run-off calculations, disposal etc. A robust and full proof Drainage Conservation scheme to protect the natural drainage and its flow parameters; along with soil conservation scheme and multiple Erosion control measures shall be prepared and included in EIA/EMP Report.	Zero Liquid Discharge concept shall be adopted. Waste water, generated from the project will be re-used after necessary treatment as per the present practice. The entire treated waste water will be reused for various purposes inside the plant. Rain Water Harvesting scheme is presented in the EIA/EMP Report.	Chapter-2.0, Section-2.15
4	Water requirement of 3834.5 m³/day shall be sourced from Damodar River through DVC supply. PP shall obtain necessary water permission from the Competent Authority. No ground water extraction is permitted.	Daily water requirement for the entire project after expansion will be around 3834.5 m³/day (Existing Units & Units under Implementation / To be implemented – 509.5 Cu.m/day, Proposed Units - 3325 Cu.m/day), out of which fresh water requirement is 3134.5 m³/day and recycle water is 700 m³/day. The water will be sourced from Damodar River through DVC supply. Necessary permission is obtained from DVC.	Chapter-2.0, Section - 2.8.6
5	Annual Wind Rose Diagram must be included in the EIA/EMP Report. For this annual data may be obtained from secondary sources, such as IMD. This is apart from the seasonal Wind Rose Diagram for which data are generated by the industry.	Windrose Diagram is included in the EIA/EMP Report.	Chapter-3.0, Section - 3.7

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Standard TOR
Standard ToR in line with Appendix III of the EIA, 2006.
Applicable to Proposals Under Industry-1 Sector
(Annexure-III)

Sl. No.	Finalised "Terms of Reference"	Reply	Reference in EIA Report
1.	Introduction		
i.	Background about the project	To make the project more viable, the company has also decided to install 1X0.5 MTPA capacity Sinter Plant, 1X500 M ³ capacity MBF, 3x650 TPD DRI Kilns (6,43,500 TPA Sponge Iron), 6x25 T Induction Furnaces, 1x25 T Electric Arc Furnaces along with 1x15 TPH Slag Crusher unit, Enhancement (through optimization in operation) the production capacity of 4x15 T + 2X10 T Induction Furnaces (as per EC 2010 & 2023), 3x12 MVA capacity Submerged Arc Furnaces, 1x0.3 MTPA capacity Rolling Mill, Lime Plant (250 TPD), Oxygen Plant (225 TPD), 1x0.5 MTPA capacity Ductile Iron Pipe (DIP) Plant, 60,000 TPA capacity Galvanising Unit along with 4x4000 Nm ³ /Hr capacity Producer Gas Plant and 100 MW capacity Captive Power Plant (70 MW	Chapter-1.0, Section-1.1,

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		WHRB + 30 MW AFBC/CFBC) within the existing plant premises at Village - Benipur, P.O.: Saltor, Dist. Purulia in West Bengal.	
ii.	Need of the project	Considering the anticipating better future market, the company is planning for the proposed expansion project.	Chapter-1.0, Section-1.4
iii.	Purpose of the EIA study	The proposed project is under Item nos. 3(a) and 1(d) i.e., “Metallurgical industries (ferrous & nonferrous)”, “Thermal Power Plants” and “Mineral Beneficiation” respectively, of Category “A” of the Schedule as per EIA Notification, 2006 and its subsequent amendments and therefore, shall require prior Environmental Clearance from the Ministry of Environment, Forest & Climate Change (MoEF&CC), Govt. of India.	Chapter-1.0, Section-1.1
iv.	Scope of the EIA study	MoEF&CC issued one Standard Terms of Reference (TOR) [File No. J-11011/566/2008-IA.II(I)] dated 10 th June, 2024 for the purpose of preparing EIA/EMP report for obtaining prior environment clearance has been prescribed.	Chapter-1.0, Section-1.1
2. Project description			
A.	Site Details		

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i.	Location of the project site covering village, Taluka/Tehsil, District and State	Project Site: Village-Benipur, P.O.: Saltor, Dist. Purulia in West Bengal.	Chapter-1.0, Section-1.4.3
ii.	Site accessibility	The project site already has proper road linkage for transport of materials and equipment.	Chapter-1.0, Section-1.4.3
iii.	A digital toposheet in pdf or shape file compatible to google earth of the study area of radius of 10 km and site location preferably on 1:50,000 scale. (including all eco-sensitive areas and environmentally sensitive places).	The toposheet of the study area of radius of 10 Km and site location on 1:50,000 SoI Toposheet No. 73(M/2) is given in of EIA/EMP report.	Chapter-1.0, Section-1.4.3
iv.	Latest High-resolution satellite image data having 1 m - 5m spatial resolution like quick bird, Ikonos, IRS P-6 pan sharpened etc., along with delineation of plant boundary coordinates. Area must include at least 100 m all around the project location.	Latest High-resolution satellite image data has been given in the EIA report.	Chapter-3.0, Section-3.5
v.	Environment settings of the site and its surrounding along with map.	Environment settings of the site and its surrounding along with map has been given in the EIA report.	Chapter-1.0, Section-1.4.3
vi.	A list of major industries with name, products and distance from plant site within study area (10 km radius) and the location of the industries shall be depicted in the study area map.	A list of major industries with name and type within study area (10 km radius) has been incorporated.	Chapter-3.0, Section-3.4
vii.	In case if the project site is in vicinity of the water body, 50 meters from the edge of the water body	The important river near the Project site is the River Damodar flowing at a distance of 2.8 Km from the	Not Applicable

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	towards the site shall be treated as no development/construction zone. If it's near the wetland, Guidelines for implementing Wetlands (Conservation and Management) Rules, 2017 may be followed.	Project site. There is no wetland near the project site.	
viii.	In case if the project site is in vicinity of the river, the industry shall not be located within the river flood plain corresponding to one in 25 years flood, as certified by concerned District Magistrate/ Executive Engineer from State Water Resources Department (or) any other officer authorized by the State Government for this purpose as per the provisions contained in the MoEF&CC Office Memorandum dated 14/02/2022.	The important river near the Project site is the River Damodar flowing at a distance of 2.8 Km from the Project site. No flood record is observed in the last 25 years.	Not Applicable
ix.	Type of land, land use of the project site.	The proposed project will be installed on the available land within the existing plant area as well as on the additional land adjacent to its existing plant premises comprising of total 30.25 Hectares (74.74 Acres) land.	Chapter-2.0, Section-2.17
x.	Status of acquisition of land. If acquisition is not complete, stage of the acquisition process as per the MoEF&CC O.M. dated 7/10/2014 shall be furnished.	The proposed project will be installed on the available land within the existing plant area as well as on the additional land adjacent to its existing plant premises comprising of total 30.25 Hectares (74.74 Acres) land. Out of the total land of 30.25 Hectares (74.74 Acres),	Chapter-2.0, Section-2.1

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		20.82 Hectares (51.44 acres) private land are already acquired. The remaining 9.43 Hectares (23.30 acres) is in the process of Acquisition.	
xi.	Project proponent shall prepare Engineering layout plan showing all internal roads minimum 6 m width and 9 m turning radius for smooth traffic flow inside including fire tender as per NBC. Road network shall connect all service areas in layout. This drawing shall include area statement showing plot area, area under roads, parking, green belt with calculations and % with respect to plot area of project site and proper indexing. If located within an Industrial area/Estate /Complex, layout of Industrial Area indicating location of unit within the Industrial area/ Estate.	The plant layout of the proposed project indicating storage area, plant area, greenbelt area, utilities etc. is given in the EIA/EMP report. The proposed project will be installed on the available land within the existing plant area as well as on the additional land adjacent to its existing plant premises comprising of total 30.25 Hectares (74.74 Acres) land.	Chapter-2.0, Section-2.3
xiii	Project proponent shall submit contour map of project site along with drainage disposal system with calculations and drawings supported with proper indexing including Rain Water Harvesting details with calculations mentioning about GW recharge along with relevant drawing.	Included in the EIA/EMP Report.	Chapter-2.0, Section-2.3
Xiv.	A detailed report covering all aspects of Fire Safety Management and Fire Emergency Plan shall be	Included in the EIA/EMP Report.	Chapter-7.0

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	submitted.		
xv	Details of drone survey for the site, needs to be included in report and presented before the EAC during appraisal of the project.	Drone video will be shown during EC Meeting.	-
B.Forest and wildlife related issues (if applicable):			
i.	Status of Forest Clearance for the use of forest land shall be submitted.	Not applicable as no forest land will be used in the proposed project.	Not Applicable
ii.	Copy of application submitted for clearance under the Wildlife (Protection) Act, 1972, to the Standing Committee of the National Board for Wildlife if the project site located within notified Eco-Sensitive Zone, 10 km radius of national park/sanctuary wherein final ESZ notification is not in place as per MoEF&CC Office Memorandum dated 8/8/2019.	Not applicable as the project site does not located within notified Eco-Sensitive Zone, 10 km radius of national park/sanctuary	Not Applicable
iii.	The projects to be located within 10 km of the National Parks, Sanctuaries, Biosphere Reserves, Migratory Corridors of Wild Animals, Eco-sensitive Zone and Eco-sensitive areas, the project proponent shall submit the map duly authenticated by Divisional Forest Officer showing the distance between the project site and the said areas.	Not applicable as the project site does not located within 10 km of the National Parks, Sanctuaries, Biosphere Reserves, Migratory Corridors of Wild Animals, Eco-sensitive Zone and Eco-sensitive areas.	Not Applicable
iv.	Wildlife Conservation Plan duly authenticated by the Competent Authority of the State Government for	Not applicable as no Schedule I fauna is present within 10 km study area of the project.	Not Applicable

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	conservation of Schedule I fauna, if any exists in the study area.		
C.	Salient features of the project		
i.	Products with capacities in Tons per Annum for the proposed project.	The Company has proposed to expand its existing Steel Plant (unit-I) by installation of 1X0.5 MTPA capacity Sinter Plant, 1X500 M ³ capacity MBF, 3x650 TPD DRI Kilns (6,43,500 TPA Sponge Iron), 6x25 T Induction Furnaces, 1x25 T Electric Arc Furnaces along with 1x15 TPH Slag Crusher unit, Enhancement (through optimization in operation) the production capacity of 4x15 T + 2X10 T Induction Furnaces (as per EC 2010 & 2023), 3x12 MVA capacity Submerged Arc Furnaces, 1x0.3 MTPA capacity Rolling Mill, Lime Plant (250 TPD), Oxygen Plant (225 TPD), 1x0.5 MTPA capacity Ductile Iron Pipe (DIP) Plant, 60,000 TPA capacity Galvanising Unit along with 4x4000 Nm ³ /Hr capacity Producer Gas Plant and 100 MW capacity Captive Power Plant (70 MW WHRB + 30 MW AFBC/CFBC) within the existing plant premises	Chapter-2.0, Section-2.1
ii.	If expansion project, status of implementation of existing project, details of existing/proposed products with production capacities in Tons per Annum.	The existing as well as proposed units with rated capacity per annum are presented in the EIA Report.	Chapter-2.0, Section-2.1
iii.	Site preparatory activities	Site preparatory activities has been given in the EIA Report.	Chapter-2.0, Section-2.1
iv.	List of raw materials	The major raw material,	Chapter-2.0,

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	required and their source along with mode of transportation.	which will be handled, consists of Iron Ore, Pellet, Manganese Ore, Coke, Coal, Dolomite, Quartzite etc. The raw materials details is presented in the EIA/EMP Report.	Section-2.6
v.	Other than raw materials, other chemicals and materials required with quantities and storage capacities.	There will be total 2X25 KL capacity of HSD Storage Tank considered in the project.	Chapter-7.0, Section-7.3
vi.	Manufacturing process details along with process flow diagram of proposed units.	Process description along with process flow sheet (Quantitative) from raw material to products has been discussed in detail in the EIA/EMP report.	Chapter-2.0, Section-2.7
vii.	Consolidated materials and energy balance for the project.	Consolidated materials balance for the project has been given in EIA/EMP Report. Energy Balance Diagram is also included in the EIA/EMP Report	Chapter-2.0, Section-2.6 Chapter-2.0, Section-2.8.4
viii.	Total requirement of surface/ground water and power with their respective sources, status of approval.	Daily water requirement for the entire project after expansion will be around 3834.5 m ³ /day (Existing Units & Units under Implementation / To be implemented – 509.5 Cu.m/day, Proposed Units - 3325 Cu.m/day), out of which fresh water requirement is 3134.5 m ³ /day and recycle water is 700 m ³ /day. The water will be sourced from Damodar River through DVC supply.	Chapter-2.0, Section-2.1 No ground water shall be used for the proposed project.
ix.	Water balance diagram	Water balance diagram has	Chapter-2.0,

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		been given in the EIA/EMP Report.	Section-2.8.6
x.	Details of Emission, effluents, hazardous waste generation and mode of disposal during construction as well as operation phase.	The details of emission from 18 stacks, effluents generation, treatment & uses, hazardous waste generation and their management in the operation phase is presented in the EIA/EMP Report.	Chapter-4.0, Section-4.3.1 Chapter-2.0, Section-2.13 Chapter-2.0, Section-2.10
xi.	Man power requirement	1600 persons (both regular and contractual)	Chapter-2.0, Section-2.1
xii.	Cost of project and scheduled time of completion.	Total Capital Cost of the Project : Rs. 1652 Crores As per an initial estimate around 36 months will be needed for implementation of the project.	Chapter-2.0, Section-2.1 & 2.5
xiii.	Brief on present status of compliance (Expansion/ modernization proposals)		
a.	Cumulative Environment Impact Assessment for the existing as well as the proposed expansion / modernization shall be carried out.	Environment Impact Assessment has been done for the existing as well proposed project.	Chapter-4.0, Section-4.3.1
b.	In case of ground water drawl for the existing unit, action plan for phasing out of ground water abstraction in next three years except for domestic purposes and shall switch over to 100% use of surface water from nearby source.	No ground water shall be used for the proposed project.	Not Applicable
c.	Copy of all the Environment Clearance(s) including Amendments thereto obtained for the project from MoEF&CC/ SEIAA shall be attached as an Annexure. A certified copy of the latest Monitoring Report of the	Copy of EC, NOC & CTO have been given as Annexure	Refer Annexure - II

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	Regional Office of the Ministry of Environment and Forests as per circular dated 30 th May, 2012 on the status of compliance of conditions stipulated in all the existing environment clearances including amendments shall be provided.		
d.	In case the existing project has not obtained Environment Clearance, reasons for not taking EC under the provisions of the EIA Notification 1994 and/or EIA Notification 2006 shall be provided. Copies of Consent to Establish/No Objection Certificate and Consent to Operate (in case of units operating prior to EIA Notification 2006, CTE and CTO of FY 2005-2006) obtained from the SPCB shall be submitted. Further, compliance report to the conditions of consents from the Regional Office of the SPCB shall be submitted.	Copy of EC, NOC & CTO have been given as Annexure	Refer Annexure - II

Sl. No.	Finalised “Terms of Reference”	Reply	Reference in EIA Report
3.	Description of the Environment:		
i.	Study period	This EIA Report is prepared on the basis of the available secondary data/ literature along with the on-site data during the study period from 1 st March, 2023 to 31 st May, 2023, representing summer	Chapter-3.0, Section-3.1.4

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	season.	
ii.	Approach and methodology for data collection as furnished below:	

Attributes	Sampling		Remarks	Compliance	
	Network	Frequency			
A. Air Environment					
Micro-Meteorological • Wind speed (Hourly) • Wind direction • Dry bulb temperature • Wet bulb temperature • Relative humidity • Rainfall • Solar radiation • Cloud cover • Environmental Lapse Rate	Minimum 1 site in the project impact area	1 hourly continuous	• IS 5182 Part 1-20 • Site specific primary data is essential • Secondary data from IMD, New Delhi • CPCB guidelines to be considered.	Micro-Meteorological data for the stipulated parameters have been generated at a location near the project site as well as those collected from the secondary sources presented in Chapter-3.0, Section-3.7	
Pollutants • PM_{2.5} • PM₁₀ • SO₂ • NO_x • CO • HC • Other parameters relevant to the project and topography of the area	At least 8-12 locations	As per National Ambient Air Quality Standards, CPCB Notification.	• Sampling as per CPCB guidelines • Collection of AAQ data (except in monsoon season) • Locations of various stations for different parameters should be related to the characteristic properties of the parameters. • The monitoring stations shall be based on the NAAQM standards	AAQ data at 8 locations for PM ₁₀ , PM _{2.5} , SO ₂ , NO _x and CO, for the period 1 st March, 2023 to 31 st May, 2023, have been collected and given in the EIA/EMP Report.	
					Chapter-3.0, Section-3.8

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			as per GSR 826(E) dated 16/11/2009 and take into account the predominant wind direction, population zone and sensitive receptors including reserved forests, Raw data of all AAQ measurement for 12 weeks of all stations as per frequency given in the NAAQM Notification of 16/11/2009 along with min., max., average and 98% values for each of the AAQ parameters from data of all AAQ stations should be provided as an annexure to the EIA Report.	
B Noise				
Hourly equivalent noise levels	At least 8-12 locations	As per CPCB norms		Noise levels monitoring was carried out at 10 locations within

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				the study area and the same is given in the EIA/EMP Report. Chapter-3.0, Section-3.10
C. Water				
Parameters for water quality - pH, temp, turbidity, magnesium, hardness, total alkalinity, chloride, sulphate, nitrate, fluoride, sodium, potassium, salinity - Total nitrogen, total phosphorus, DO, BOD, COD, Phenol - Heavy metals - Total coliforms, faecal coliforms - Phyto plankton - Zoo plankton	Samples for water quality should be collected and analyzed as per : - IS: 2488 (Part 1-5) methods for sampling and testing of Industrial effluents - Standard methods for examination of water and wastewater analysis published by American Public Health Association.			Surface Water samples were collected from seven (7) different locations for ponds to analyze and assess the surface water quality of the study area and the same is given in the EIA/EMP Report. Chapter-3.0, Section-3.9
For River Bodies				
- Total Carbon - pH - Dissolved Oxygen - Biological Oxygen Demand - Free NH4 - Boron - Sodium Absorption Ratio - Electrical conductivity	Surface water quality of the nearest River (60m upstream and downstream) and other surface water bodies	- Yield of water sources to be measured during critical season - Standard methodology for collection of surface water (BIS standards)	Surface Water samples were collected from two (2) locations of the River Damodar Chapter-3.0, Section-3.9	
For Ground Water		Ground water monitoring data should be collected at minimum of 18 locations (from existing wells/tube wells/ exiting current records) from the study area and shall be included. Ground Water monitoring was carried out at 9 locations. The analysed data are given in the EIA/EMP Report. Chapter-3.0, Section-3.9		

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D. Traffic Study		
• Type of vehicles • Frequency of vehicles for transportation of materials • Additional traffic due to proposed project • Parking arrangement	Traffic study has been carried out at two relevant locations and the same is given in the EIA/EMP Report.	Chapter-3.0, Section-3.8.4
E. Land Environment		
Soil • Particle size distribution • Texture • pH • Electrical conductivity • Cation exchange capacity • Alkali metals • Sodium Absorption Ratio (SAR) • Permeability • Water holding capacity • Porosity	Soil samples be collected as per BIS specifications	Soil Characteristic has been studied as per CPCB guidelines and the same is given in the EIA/EMP Report. Chapter-3.0, Section-3.6
Land use/Landscape • Location code • Total project area • Topography • Drainage (natural) • Cultivated, forest, plantations, water bodies, roads and settlements		Recent land-use map based on satellite imagery, High-resolution satellite image data has been given in EIA/EMP Report. Chapter-3.0, Section-3.5

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F. Biological Environment Aquatic • Primary productivity • Aquatic weeds • Enumeration of phyto plankton, zoo plankton and benthos • Fisheries • Diversity indices • Trophic levels • Rare and endangered species • Marine Parks/ Sanctuaries/ closed area/coastal regulation zone (CRZ) Terrestrial • Vegetation-species list, economic importance, forest produce, medicinal value • Importance value index (IVI) of trees • Fauna • Avi fauna • Rare and endangered species • Sanctuaries/National park/Biosphere reserve • Migratory routes	• Detailed description of flora and fauna (terrestrial and aquatic) existing in the study area shall be given with special reference to rare, endemic and endangered species. Indicator species which indicate ecological and environment degradation should be identified and included to clearly state whether the proposed project would result in to any adverse effect on any species. • Samples to collect from upstream and downstream of discharge point, nearby tributaries at downstream, and also from dug wells close to activity site. • For forest studies, direction of wind should be considered while selecting forests. • Secondary data to collect from Government offices, NGOs, published literature.	The study of flora and fauna (terrestrial and aquatic) existing in the study area has been undertaken and the same is given in the EIA/EMP Report. No Schedule-1 fauna was found in the study area. Chapter-3.0, Section-3.11
G. Socio-economic • Demographic structure • Infrastructure resource base • Economic resource base • Health status: Morbidity pattern • Cultural and aesthetic attributes • Education	• Socio-economic survey is based on proportionate, stratified and random sampling method. • Primary data collection through questionnaire • Secondary data from census records, statistical hard books, topo sheets, health records and relevant official records available with Govt. Agencies.	Socio-economic status of the study area was determined based on primary & secondary information and the same is given in the EIA/EMP Report. Chapter-3.0, Section-3.12

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- iii. Interpretation of each environment attribute shall be enumerated and summarized as given below:
- Ambient air quality** - The values of all the ambient air parameters i.e., PM₁₀, PM_{2.5}, SO₂, NO₂ and CO at the respective 8 monitoring locations are within the stipulated limits on all the occasions as per NAAQ Standard.
- Ambient Noise quality** - The Equivalent Noise Levels in the Industrial locations are within permissible limits. However, the noise level has exceeded the permissible limits for Residential, Commercial and Sensitive locations in the study area. Such high noise levels may be attributed mainly to the noise, generated due to the vehicular traffic.
- Surface water quality** - Damodar river water quality parameters are within the standard for Class C i.e., Drinking water source after conventional treatment and after disinfection.
- Ground water quality** - Ground water physico-chemical properties in the study area showed that the water strata mainly from Bicarbonate buffer system has appreciable amount of alkalinity & Hardness. Calcium & Magnesium which are beneficial for human health are found satisfactory.
- Soil quality** - Loamy texture of the soil of this area along with sufficient level of organic matter renders moderate productivity of agricultural crops.
- Biological Environment** - The biodiversity value of the studied ecosystem obtained was 4.51. Thus, the proposed project site has moderate biodiversity, which must be conserved.
- Land use** - The area has only mixed cropped land. This type of land use covers an area of about 202.8 sq.m which is 64.5% of the total study area. Agriculture is the predominant feature of land use of the study area.
- Socio-economic environment** - It is evident from the above comparison that there has been slight increase in the family size while literacy rate has marginally improved.

Sl. No.	Finalised "Terms of Reference"	Reply	Reference in EIA Report
4.	Anticipated Environment Impacts and mitigation measures (In case of expansion, cumulative impact assessment shall be carried out)		
i.	Identification of potential impacts in the form of a matrix for the construction and operation phase for all the environment components.	Matrix for the construction and operation phase for all the environment components is presented in the EIA/EMP Report.	Chapter-4.0 Section-4.3.8
ii.	Impact on ambient air quality (Sources; Embedded control measures;	Impact on ambient air quality for the construction and operation phase is presented	Chapter-4.0 Section-4.2.1

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	Assessment; Mitigation measures; Residual impact) a. Construction phase b. Operation phase	in the EIA/EMP Report.	Chapter-4.0 Section-4.3.1
	● Details of stack emissions from the existing as well as proposed activity.	The stacks details is presented in the EIA/EMP Report.	Chapter-4.0 Section-4.3.1
	● Assessment of ground level concentration of pollutants from the stack emission based on AQIP Modelling. The air quality contours shall be plotted on a location map showing the location of project site, habitation nearby, sensitive receptors, if any along with wind rose map for respective period.	Ground Level Concentration (GLC) of pollutants from the stack emission is calculated using ISCST3 model and the result along with isopleths is presented in the EIA/EMP report.	Chapter-4.0 Section-4.3.1
	● Impact on ground level concentration, under normal, abnormal and emergency conditions. Measures to handle emergency situations in the event of uncontrolled release of emissions.	Ground Level Concentration (GLC) of pollutants from the stack emission is calculated using ISCST3 model for total 18 stacks and the result is presented in the EIA/EMP report.	Chapter-4.0 Section-4.3.1
iii.	Impact on ambient noise quality (Sources; Embedded control measures; Assessment; Mitigation measures; Residual impact). a. Construction phase b. Operation phase	Impact on ambient noise quality for the construction and operation phase is presented in the EIA/EMP Report.	Chapter-4.0 Section-4.2.5 Chapter-4.0 Section-4.3.4
iv.	Impact on traffic (Sources; Embedded control measures; Assessment; Mitigation measures; Residual impact) a. Construction phase b. Operation phase	Impact on ambient noise quality for the construction and operation phase is presented in the EIA/EMP Report.	Chapter-4.0 Section-4.2.5 Chapter-4.0 Section-4.3.4
v.	Impact on soil quality (Sources; Embedded control measures; Assessment; Mitigation measures; Residual impact) a. Construction phase b. Operation phase	Impact on soil quality for the construction and operation phase is presented in the EIA/EMP Report.	Chapter-4.0 Section-4.2.5 Chapter-4.0 Section-4.3.4
vi.	Impact on land use (Sources; Embedded control measures; Assessment; Mitigation measures; Residual impact) a. Construction phase	Impact on land use for the construction and operation phase is presented in the EIA/EMP Report.	Chapter-4.0 Section-4.2.6 Chapter-4.0 Section-4.3.6

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	b. Operation phase		
vii.	Impact on surface water resource and quality (Sources; Embedded control measures; Assessment; Mitigation measures; Residual impact) a. Construction phase b. Operation phase	Impact on surface water for the construction and operation phase is presented in the EIA/EMP Report.	Chapter-4.0 Section-4.2.4 Chapter-4.0 Section-4.3.3
viii.	Impact on ground water resource and quality (Sources; Embedded control measures; Assessment; Mitigation measures; Residual impact) a. Construction phase b. Operation phase	Impact on ground water for the construction and operation phase is presented in the EIA/EMP Report.	Chapter-4.0 Section-4.2.4 Chapter-4.0 Section-4.3.3
ix.	Impact on terrestrial and aquatic habitat (Sources; Embedded control measures; Assessment; Mitigation measures; Residual impact) a. Construction phase b. Operation phase	Impact on ecology for the operation phase is presented in the EIA/EMP Report.	Chapter-4.0 Section-4.3.8
x.	Impact on socio-economic environment (Sources; Embedded control measures; Assessment; Mitigation measures; Residual impact) a. Construction phase c. Operation phase	Impact on socio-economic environment for the construction and operation phase is presented in the EIA/EMP Report.	Chapter-4.0 Section-4.2.7 Chapter-4.0 Section-4.3.7
xi.	Impact on occupational health and safety (Sources; Embedded control measures; Assessment; Mitigation measures; Residual impact) a. Construction phase b. Operation phase	Impact on occupational health and safety for the construction and operation phase is presented in the EIA/EMP Report.	Chapter-10.0 Section-10.12
5.	Analysis of Alternatives (Technology & Site) i. No project scenario ii. Site alternative iii. Technical and social concerns iv. Conclusion	The proposed project is the expansion of the existing project so it is proposed within the existing plant site for the overall integration. So, no alternative site has been explored. Manufacturing technologies for all the units proposed in the project are well proven technologies all over the world. The proposed project	Chapter-5.0

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		will follow the Best Available Technology.	
6.	Environmental Monitoring Program		
i.	Details of the Environment Management Cell.	Details of the Environment Management Cell is covered in the EIA/EMP Report.	Chapter-10.0 Section-10.4
ii.	Performance monitoring schedule for all pollution control devices shall be furnished.	The details of monitoring is presented in the EIA/EMP Report.	Chapter-6.0 Section-6.2
iii.	Corporate Environment Policy a. Does the company have a well laid down Environment Policy approved by its Board of Directors? If so, it may be detailed in the EIA report. b. Does the Environment Policy prescribe for standard operating process/ procedures to bring into focus any infringement/deviation/ violation of the environment or forest norms/conditions? If so, it may be detailed in the EIA. c. What is the hierarchical system or Administrative order of the company to deal with the environment issues and for ensuring compliance with the environment clearance conditions? Detail of this system may be given. d. Does the company have system of reporting of non compliances/violations of environment norms to the Board of Directors of the company and/or shareholders or stakeholders at large? This reporting mechanism shall be detailed in the EIA report.	Corporate Environment Policy by the Company is presented in the EIA/EMP Report.	Chapter-10.0 Section-10.15
iv.	Action plan for post-project environment monitoring matrix	The details of post-project monitoring is presented in the EIA/EMP Report.	Chapter-6.0 Section-6.2

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7.	Additional Studies		
i.	Public consultation details (Entire proceedings as separate annexure along with authenticated English Translation of Public Consultation proceedings).	Public Hearing will be conducted.	Chapter-7.0 Section-7.11
ii.	Summary of issues raised during public consultation along with action plan to address the same as per MoEF&CC O.M. 30/09/2020.	Point-wise compliance to the issues raised during public hearing along with action plan as per MoEF&CC O.M. dated 30/9/2020 : time frame : three years and budgetary provision will be done after Public Hearing.	Chapter-7.0 Section-7.11
iii.	Risk assessment • Methodology • Hazard identification • Frequency analysis • Consequence analysis • Risk assessment outcome • Emergency response and preparedness plan	Detailed Risk Assessment of the proposed project has been given in Chapter-7.0.	Chapter-7.0 Sections-7.2 to 7.4
8.	Project Benefits		
i.	Environment benefits	Implementation of proposed expansion project having its project cost around Rs. 1652 Crores will be a boon to the region and will give various benefits to society of the region like Improvement of living conditions to the local people, Improvement of the Society, Infrastructure Development, Improvement of Hospitality Services, Employment Opportunities etc.	Chapter-8.0
ii.	Social infrastructure		
iii.	Employment and business opportunity		
iv.	Other tangible benefits		
9.	Environment Cost Benefits Analysis		
i.	Net present value	Environment Cost Benefits Analysis has been given in Chapter-9.0 of the Final EIA Report.	Chapter-9.0
ii.	Internal rate of return		
iii.	Benefit cost ratio		
iv.	Cost effectiveness analysis		
10	Environment Management Plan (Construction and Operation phase)		
i.	Air quality management plan	Presented in the EIA/EMP Report.	

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ii.	Noise quality management plan	Presented in the EIA/EMP Report.	Chapter-10.0
iii.	Solid and hazardous waste management plan	Presented in the EIA/EMP Report.	
iv.	Effluent management plan	Presented in the EIA/EMP Report.	
v.	Storm water management plan	Presented in the EIA/EMP Report.	
vi.	Rain water harvesting plan	Presented in the EIA/EMP Report.	
vii.	Occupational health and safety management plan	Presented in the EIA/EMP Report.	
viii.	Green belt development plan	Presented in the EIA/EMP Report.	
ix.	Socio-economic management plan	Presented in the EIA/EMP Report.	Chapter-7.0
x.	Wildlife conservation plan (In case of presence of schedule I species)	There is no schedule-I in the study area.	-
xi.	Total capital and recurring cost/annum for environment pollution control measures shall be included.	Total Capital Cost for Environmental Pollution Control Measures: Rs. 100 Crores. Recurring Cost / annum for Environmental Pollution Control Measures: Rs. 10 Crores.	Chapter-10.0
11	Conclusion of the EIA study	A separate chapter on “ Summary & Conclusion ” is included in the EIA/EMP Report.	Chapter-11.0
12	In addition to the above, any litigation pending against the project and/or any direction/order passed by any Court of Law against the project, if so, details thereof shall also be included. Has the unit received any notice under the Section 5 of Environment (Protection) Act, 1986 or relevant Sections of Air and Water Acts? If so, details thereof an compliance/ATR to the notice(s) and present status of the case.	There is no litigation pending against the project and/or any direction/order passed by any Court of Law against the project.	-

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CHAPTER-1.0 INTRODUCTION

1.1 PURPOSE OF THE REPORT

M/s AIC Iron Industries Private Limited was incorporated on 28th February, 2003, with one of the prime objectives being engagement in manufacturing activities of iron and steel and other allied products. The company having its registered office at 25, Ganesh Chandra Avenue, 4th Floor, Kolkata-700013 in West Bengal.

The Company is operating a Steel Plant at village: Benipur, P.O. : Saltor, P.S. Neturia, District: Purulia, West Bengal. The company undertook its first manufacturing activity by setting up 1x3 T + 1x6 T Induction Furnaces for production of 28,800 TPA Billets. This was installed as per NOC vide Memo no: 1211-WPBA-NOC(816)/05 dated 09.11.2005 for 1X3 T Induction Furnace and NOC vide Memo no. 498-WPBA-NOC(816)/05 dated 03.05.2010 for 1X6 T Induction Furnace. The units are in operation and producing 28,800 TPA Billets as per CTO vide Consent Memo No. 194-WPBA/Red/Prt/Cont/216/07 dated 04.05.2023, valid till 31.03.2028 has been obtained for the above mentioned facilities.

Meanwhile the Company obtained an Environmental Clearance (EC) vide File No. J-11011/566/2008-IA-II-(I) dated 27.08.2010 and subsequently, installed 1x15 T Induction Furnace based on this EC. Thus, 1x3 T + 1x6 T + 1x15 T Induction Furnaces is under operation for ultimate production of 78,300 TPA Billets. The Company is also obtained an Environmental Clearance (EC) vide File No. J-11011/566/2008-IA-II-(I) dated 04.01.2023 for installation of 1x400 TPD DRI Kiln to produce 1,32,000 TPA Sponge Iron, 3x15 T Induction Furnaces with matching LRF & CCM to produce 1,46,000 TPA billets for increasing the capacity of Steel Melting Shop, 0.192 MTPA Rolling Mill with 1x15 TPH Reheating Furnace for production of Structural Steels (Angles, Channels, Joist, TMT Bars, Wire Rod, Strips & Pipes etc.) and 20 MW capacity Captive Power Plant (10 MW WHRB + 10 MW AFBC) within the existing plant premises at Village - Benipur, P.O.: Saltor, Dist. Purulia in West Bengal. **As per EC dated 04.01.2023, 1x400 TPD DRI Kiln, 1x15 T Induction Furnace,**

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Rolling Mill of capacity 24,000 TPA for production of Structural Steels (Strips & Pipes etc.) along with 10 MW capacity Captive Power Plant (WHRB based) are installed. Remaining units as per latest EC, 2023 is under implementation stage or to be implemented.

Now, to make the project more viable, the company has also decided to install 1X0.5 MTPA capacity Sinter Plant, 1X500 M³ capacity MBF, 3x650 TPD DRI Kilns (6,43,500 TPA Sponge Iron), 6x25 T Induction Furnaces, 1x25 T Electric Arc Furnaces along with 1x15 TPH Slag Crusher unit, Enhancement (through optimization in operation) the production capacity of 4x15 T + 2X10 T Induction Furnaces (as per EC 2010 & 2023), 3x12 MVA capacity Submerged Arc Furnaces, 1x0.3 MTPA capacity Rolling Mill, Lime Plant (250 TPD), Oxygen Plant (225 TPD), 1x0.5 MTPA capacity Ductile Iron Pipe (DIP) Plant, 60,000 TPA capacity Galvanising Unit along with 4x4000 Nm³/Hr capacity Producer Gas Plant and 100 MW capacity Captive Power Plant (70 MW WHRB + 30 MW AFBC/CFBC) within the existing plant premises at Village - Benipur, P.O.: Saltor, Dist. Purulia in West Bengal.

As per EIA Notification on 14th September 2006, all projects or activities, including expansion and modernization of existing projects or activities or change in Product Mix, falling under 'Category A' in the Schedule shall require prior Environmental Clearance (EC) from Ministry of Environment, Forest & Climate Change (MoEF&CC), Govt. of India.

The proposed project activity of **M/s. AIC Iron Industries Pvt. Ltd.** is listed at Sl. No. 3(a) i.e., Metallurgical industries (ferrous & non-ferrous) & 1(d) of the schedule of the EIA Notification, 2006 under "Category A" and appraised at Central Level.

Accordingly, **M/s. AIC Iron Industries Pvt. Ltd.** submitted an online ToR application along with Pre-feasibility Report to MoEF&CC for seeking prior Environmental Clearance for its proposed expansion of existing steel plant vide online Proposal No. IA/WB/IND1/439089/2023 dated 5th August, 2023. Subsequently, the proposal was considered in the 58th meeting of the Re-constituted Expert Appraisal Committee [EAC] (Industry-1) held on 15th May, 2024 to determine the Terms of Reference (TOR) for undertaking detailed EIA study for obtaining Environmental Clearance (EC) as per EIA Notification 2006. Accordingly, MoEF&CC issued one letter [**Ref.**

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File No J-11011/566/2008-IA.II(I)] dated 10th June, 2024 with mention of the finalized Terms of Reference (**Annexure-I**).

As advised by the Ministry of Environment, Forest & Climate Change (MoEF&CC), Govt. of India, this Draft EIA/EMP Report is prepared, accommodating all the components, based on finalized ToRs for its submission to West Bengal Pollution Control Board (WBPCB) for the conduct of Public Hearing/Consultation.

The EIA Report has been prepared on the basis of the available secondary data/literature along with the on-site data during the period (**1st March, 2023 to 31st May, 2023**) representing the summer season, generated through on-site monitoring of relevant environmental components and parameters.

1.2 INDENTIFICATION OF THE PROJECT

M/s AIC Iron Industries Pvt. Ltd., has proposed for expansion of existing steel plant by installation of 1X0.5 MTPA capacity Sinter Plant, 1X500 M³ capacity MBF, 3x650 TPD DRI Kilns (6,43,500 TPA Sponge Iron), 6x25 T Induction Furnaces, 1x25 T Electric Arc Furnaces along with 1x15 TPH Slag Crusher unit, Enhancement (through optimization in operation) the production capacity of 4x15 T + 2X10 T Induction Furnaces (as per EC 2010 & 2023), 3x12 MVA capacity Submerged Arc Furnaces, 1x0.3 MTPA capacity Rolling Mill, Lime Plant (250 TPD), Oxygen Plant (225 TPD), 1x0.5 MTPA capacity Ductile Iron Pipe (DIP) Plant, 60,000 TPA capacity Galvanising Unit along with 4x4000 Nm³/Hr capacity Producer Gas Plant and 100 MW capacity Captive Power Plant (70 MW WHRB + 30 MW AFBC/CFBC) within the existing plant premises at Village - Benipur, P.O.: Saltor, Dist. Purulia in West Bengal.

The existing as well as proposed units with rated capacity per annum are presented in **Table-1.1**.

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TABLE-1.1 : OVERALL PROJECT SCENARIO

Sl. No.	Name of the Units	Units as per NOC from WBPCB	Units as per EC dated 27.08.2010	Units as per EC dated 04.01.2023	Units under Operation	Units under Implementation / To be Implemented	Proposed Units	Overall Project Scenario
1	Sinter Plant	-	-	-	-	-	1X0.5 MTPA (1x70 M ²) Sinter	1X0.5 MTPA (1x70 M ²) Sinter
2	Mini Blast Furnace (MBF) Plant	-	-	-	-	-	1X500 M ³ (5,00,000 TPA Liq. Metal)	1X500 M ³ (5,00,000 TPA Liq. Metal)
3	Sponge Iron Plant	-	4x100 TPD DRI Kilns (1,20,000 TPA Sponge Iron) (Dropped)	1x400 TPD DRI Kiln (1,32,000 TPA Sponge Iron)	-	1x400 TPD DRI Kiln (1,32,000 TPA Sponge Iron)	3x650 TPD DRI Kilns (6,43,500 TPA Sponge Iron)	1x400 TPD + 3x650 TPD DRI Kilns (7,75,500 TPA Sponge Iron)
4	Induction Furnaces with matching CCM & Caster with LRF, Slab	1x3 T + 1x6 T (28,800 TPA Billets) (As per NOC from WBPCB)	2x15 T (90,000 TPA Billets) (1x15 T Installed & 1x15 T dropped)	3x15 T + 2x10 T (2,10,500 TPA Billets) (Existing 1x3 T + 1x6 T IFs shall be replaced by 2x10 T IFs)	(1x3 T + 1x6 T) # + (1x15 T) (as per EC 2010) + (1x15 T) (as per EC 2023) (28,800 TPA + 45,000 TPA + 48,667 TPA = 1,22,467 TPA Billets)	2x15 T + 2x10 T (1,61,833 TPA Billets) (Existing 1x3 T + 1x6 T IFs shall be replaced by 2x10 T IFs)	6x25 T (New) (6,17,400 TPA Billets) along with 1x15 TPH Slag Crusher unit And Enhancement (through optimization in operation) the production capacity of 4x15 T + 2X10 T (as per EC	6x25 T (New) (6,17,400 TPA Billets) along with 1x15 TPH Slag Crusher unit And Enhancement (through optimization in operation) the production capacity of 4x15 T + 2X10 T (as per EC 2010 & 2023) from 2,55,500 TPA to 3,29,280 TPA Billets (Total 9,46,680 TPA

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							2010 & 2023) from 2,55,500 TPA to 3,29,280 TPA Billets (Total 9,46,680 TPA Billets) with matching LRF, CCM & Slab Caster)	Billets) with matching LRF, CCM & Slab Caster)
5	Electric Arc Furnaces with matching LRF/15 T capacity VOD (@24 Heats, 330 Working Days) & CCM	-	-	-	-	-	1x25 T (1,94,000 TPA Billets) with matching LRF/15 T capacity VOD	1x25 T (1,94,000 TPA Billets) with matching LRF/15 T capacity VOD
6	Ferro Alloy plant and 20 TPH Chrome Ore Briquetting Plant	-	-	-	-	-	3x12 MVA (65,600 TPA Si-Mn or 88,800 TPA Fe-Mn or 30,400 TPA Fe-Si or 67,200 Low Carbon Fe-Cr)	3x12 MVA (65,600 TPA Si-Mn or 88,800 TPA Fe-Mn or 30,400 TPA Fe-Si or 67,200 Low Carbon Fe-Cr)
7	Rolling Mill	-	-	1,92,000 TPA Structural Steels (Angles, Channels, Joist, TMT Bars, Wire Rod, Strips & Pipes etc.) with	24,000 TPA Structural Steels (Strips & Pipes etc.)	1,68,000 TPA Structural Steels (Angles, Channels, Joist, TMT Bars, Wire Rod, Strips &	1x0.3 MTPA TMT bars, Wire Rod, Structural etc. with 1x25 TPH Reheating Furnace	0.192 MTPA + 1X0.3 MTPA Structural Steels (Angles, Channels, Joist, TMT Bars, Wire Rod, Strips & Pipes

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				1x15 TPH Reheating Furnace		Pipes etc.) with 1x15 TPH Reheating Furnace	(Optional)	etc.) with 1x15 TPH + 1x25 TPH (Optional) Reheating Furnaces
8	Lime Plant	-	-	-	-	-	1x250 TPD Quicklime	1x250 TPD Quicklime
9	Oxygen Plant	-	-	-	-	-	1x225 TPD Liquid Oxygen	1x225 TPD Liquid Oxygen
10	Ductile Iron Pipe (DIP) Plant	-	-	-	-	-	1X0.5 MTPA Ductile Iron Pipe	1X0.5 MTPA Ductile Iron Pipe
11	Galvanising Unit	-	-	-	-	-	60,000 TPA	60,000 TPA
12	Producer Gas Plant (PGP)	-	-	-	-	-	4x4000 Nm ³ /Hr (16,000 Nm ³ /Hr) Producer Gas	4x4000 Nm ³ /Hr (16,000 Nm ³ /Hr) Producer Gas
13	Captive Power Plant	-	12 MW CPP (8 MW WHRB + 4 MW AFBC) (Dropped)	20 MW CPP (10 MW WHRB + 10 MW AFBC)	10 MW CPP (WHRB)	10 MW CPP (AFBC)	100 MW CPP (70 MW WHRB + 30 MW AFBC/CFBC)	120 MW CPP (80 MW WHRB + 10 MW AFBC + 30 MW AFBC/CFBC)

Note:

Induction Furnace: 12 Heats per day & 350 working days per year.

Existing (1x3 T+1x6 T) Induction Furnaces will be replaced by 2x10 T Induction Furnaces.

The proposed project is listed at Sl. Nos. 3(a) & 1(d) under category 'A' of Schedule of EIA Notification, 2006.

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The proposed project will be installed on the available land within the existing plant area as well as on the additional land adjacent to its existing plant premises comprising of total 30.25 Hectares (74.74 Acres) land. Most of the facilities like electricity, water, transportation accessibility, skilled/unskilled manpower etc. are already available in the project area for setting up of the proposed expansion. The whole projected land for the proposed expansion project is generally flat and does not come under the flood hazard zone.

As there is no human settlement in the whole projected land for the proposed expansion project, there is no need of Resettlement and Rehabilitation (R&R) Plan and setting up of the project would not alter the current land use pattern.

Photographs of the existing plant and the Proposed Project Site have been presented in **Figure-1.1 and Figure-1.2** respectively.



FIGURE-1.1 : EXISTING PLANT



FIGURE-1.2 : PROPOSED PROJECT SITE

1.3 THE PROJECT PROPONENT

M/s AIC Iron Industries Private Limited was incorporated on 28th February, 2003, having its registered office at 25, Ganesh Chandra Avenue, 4th Floor, Kolkata-700013 in West Bengal.

The present management has already set an example of operating their existing plant with modern management. The Company had/will adopt the latest techniques of Manufacturing, Management, Inventory Control, Finance Management, Human Resource Relation and image building. An emphasis shall be placed for good material & energy management and environment cleanliness. The overall affairs of the Company shall be managed under the guidance of Sri Dinesh Adukia. The other professional team of Company Executives will lend the required expertise in conducting all the major functions of this business house. The Board of the Directors of the Company is as under :

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- Sri Dinesh Adukia - Director,
- Sri Vivek Adukia - Director, and
- Sri Gyan Adukia- Director

The company is now planning for expansion of existing steel plant by installation of 1X0.5 MTPA capacity Sinter Plant, 1X500 M³ capacity MBF, 3x650 TPD DRI Kilns (6,43,500 TPA Sponge Iron), 6x25 T Induction Furnaces, 1x25 T Electric Arc Furnaces along with 1x15 TPH Slag Crusher unit, Enhancement (through optimization in operation) the production capacity of 4x15 T + 2X10 T Induction Furnaces (as per EC 2010 & 2023), 3x12 MVA capacity Submerged Arc Furnaces, 1x0.3 MTPA capacity Rolling Mill, Lime Plant (250 TPD), Oxygen Plant (225 TPD), 1x0.5 MTPA capacity Ductile Iron Pipe (DIP) Plant, 60,000 TPA capacity Galvanising Unit along with 4x4000 Nm³/Hr capacity Producer Gas Plant and 100 MW capacity Captive Power Plant (70 MW WHRB + 30 MW AFBC/CFBC) within the existing plant premises at Village - Benipur, P.O.: Saltor, Dist. Purulia in West Bengal.

1.4 BRIEF DESCRIPTION OF THE PROJECT

1.4.1 Nature of the Project

M/s. AIC Iron Industries Pvt. Ltd. is planning to expand its steel plant within the existing plant premises at village - Benipur, P.O.: Saltor, Dist. Purulia in West Bengal by installation of 1X0.5 MTPA capacity Sinter Plant, 1X500 M³ capacity MBF, 3x650 TPD DRI Kilns (6,43,500 TPA Sponge Iron), 6x25 T Induction Furnaces, 1x25 T Electric Arc Furnaces along with 1x15 TPH Slag Crusher unit, Enhancement (through optimization in operation) the production capacity of 4x15 T + 2X10 T Induction Furnaces (as per EC 2010 & 2023), 3x12 MVA capacity Submerged Arc Furnaces, 1x0.3 MTPA capacity Rolling Mill, Lime Plant (250 TPD), Oxygen Plant (225 TPD), 1x0.5 MTPA capacity Ductile Iron Pipe (DIP) Plant, 60,000 TPA capacity Galvanising Unit along with 4x4000 Nm³/Hr capacity Producer Gas Plant and 100 MW capacity Captive Power Plant (70 MW WHRB + 30 MW AFBC/CFBC).

The proposed project activity is listed at Sl. No. 3(a) i.e., Metallurgical industries (ferrous & non-ferrous) & 1(d) of the schedule of the EIA

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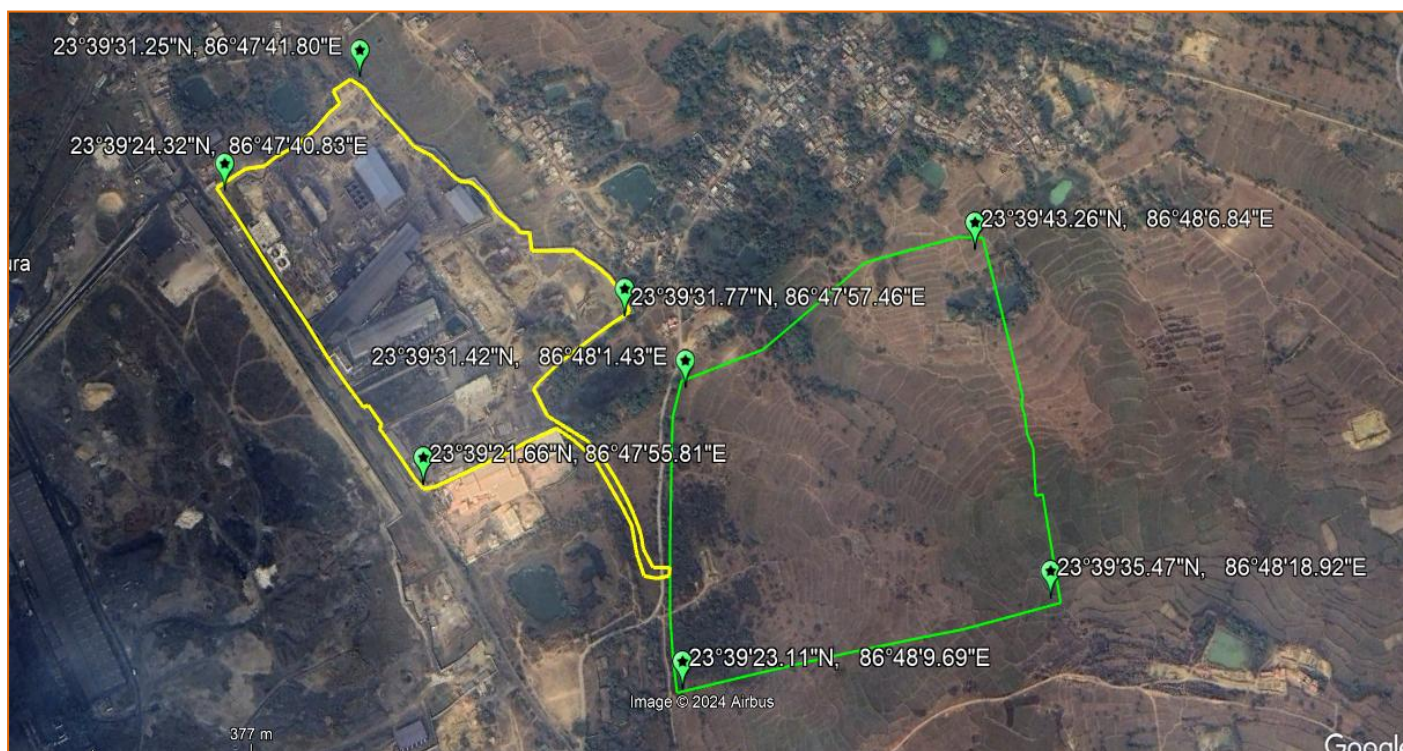
Notification, 2006 under “Category A” and therefore, shall require prior Environmental Clearance (EC) from Ministry of Environment, Forest & Climate Change (MoEF&CC), Govt. of India.

1.4.2 Size of the Project

M/s. AIC Iron Industries Pvt. Ltd. is decided to expand its existing steel plant by installing installation of 1X0.5 MTPA capacity Sinter Plant, 1X500 M³ capacity MBF, 3x650 TPD DRI Kilns (6,43,500 TPA Sponge Iron), 6x25 T Induction Furnaces, 1x25 T Electric Arc Furnaces along with 1x15 TPH Slag Crusher unit, Enhancement (through optimization in operation) the production capacity of 4x15 T + 2X10 T Induction Furnaces (as per EC 2010 & 2023), 3x12 MVA capacity Submerged Arc Furnaces, 1x0.3 MTPA capacity Rolling Mill, Lime Plant (250 TPD), Oxygen Plant (225 TPD), 1x0.5 MTPA capacity Ductile Iron Pipe (DIP) Plant, 60,000 TPA capacity Galvanising Unit along with 4x4000 Nm³/Hr capacity Producer Gas Plant and 100 MW capacity Captive Power Plant (70 MW WHRB + 30 MW AFBC/CFBC) at village - Benipur, P.O.: Saltor, Dist. Purulia in West Benga.

1.4.3 Location of the Project Site

The project site for proposed expansion project is located at Village : Benipur, P.O. : Saltor, P.S. : Neturia, Dist. : Purulia in the state of West Bengal. Geographical Co-ordinates of the Project Site are ranged from Latitude: 23°39'21.74"N to 23°39'43.56"N and Longitude: 86°47'39.81"E to 86°48'19.26"E with Elevation is about 160 m (524 ft) Above Mean Sea Level (AMSL). Geographical Co-ordinates of all the four corners of the project site are as follows:

**Surroundings of the Project Site:**

The nearest Railway Station - Muradi Railway Station is located about 7.2 km towards south-south-east direction from the project site. The State Highway-5 (SH-5) (Rupnarayanpur - Junput) is passing around 2.2 km towards east-south-east direction w.r.t. the project site. The G.T. Road (National Highway-2) (Delhi - Kolkata) is passing around 8.7 km towards north-north-east direction w.r.t. the Project Site. The proposed site area is well developed and has all necessary infrastructure facilities such as motorable road upto the plant site, nearness to rail head, telephone facilities etc.

The Nearest Town - Kulti is located about 10 km towards north-east direction from the Project site. Industrially developed city - Asansol is located about 16 km towards east direction w.r.t. the Project site. Puruliya, the District Headquarter is located around 57 km in south-west direction from the project site.

The nearest distance of Damodar River is around 2.8 km towards north-west direction w.r.t. the Project Site. There is a major forest i.e., Panchet Forest located on the Garh Panchkot Hill within the study area. The nearest distance of the Panchet forest/Garh Panchkot Hill is around 3.2 km in south-west direction w.r.t proposed project site.

The nearest Airport - Kazi Nazrul Islam Airport, Andal is located about 46 km in east direction w.r.t. the project site and the Netaji Subhas Chandra Bose International (NSCBI) Airport, Kolkata is located around 202 km in south-east direction from the project site.

The location of project site on Google view map is presented in **Figures-1.3**. The 10 km radius study area on Google Map & on Topo Sheet for EIA study are presented in **Figures-1.4 & 1.5** respectively.



FIGURE-1.3 : PROJECT SITE ON GOOGLE MAP

Address:

**Village: Benipur, P.O.: Saltor, P.S.: Neturia,
Dist.: Purulia, West Bengal**

Co-ordinates:

Latitude: 23°39'21.74"N to 23°39'43.56"N and Longitude: 86°47'39.81"E to 86°48'19.26"E with Elevation is about 160 m (524 ft) Above Mean Sea Level (AMSL)

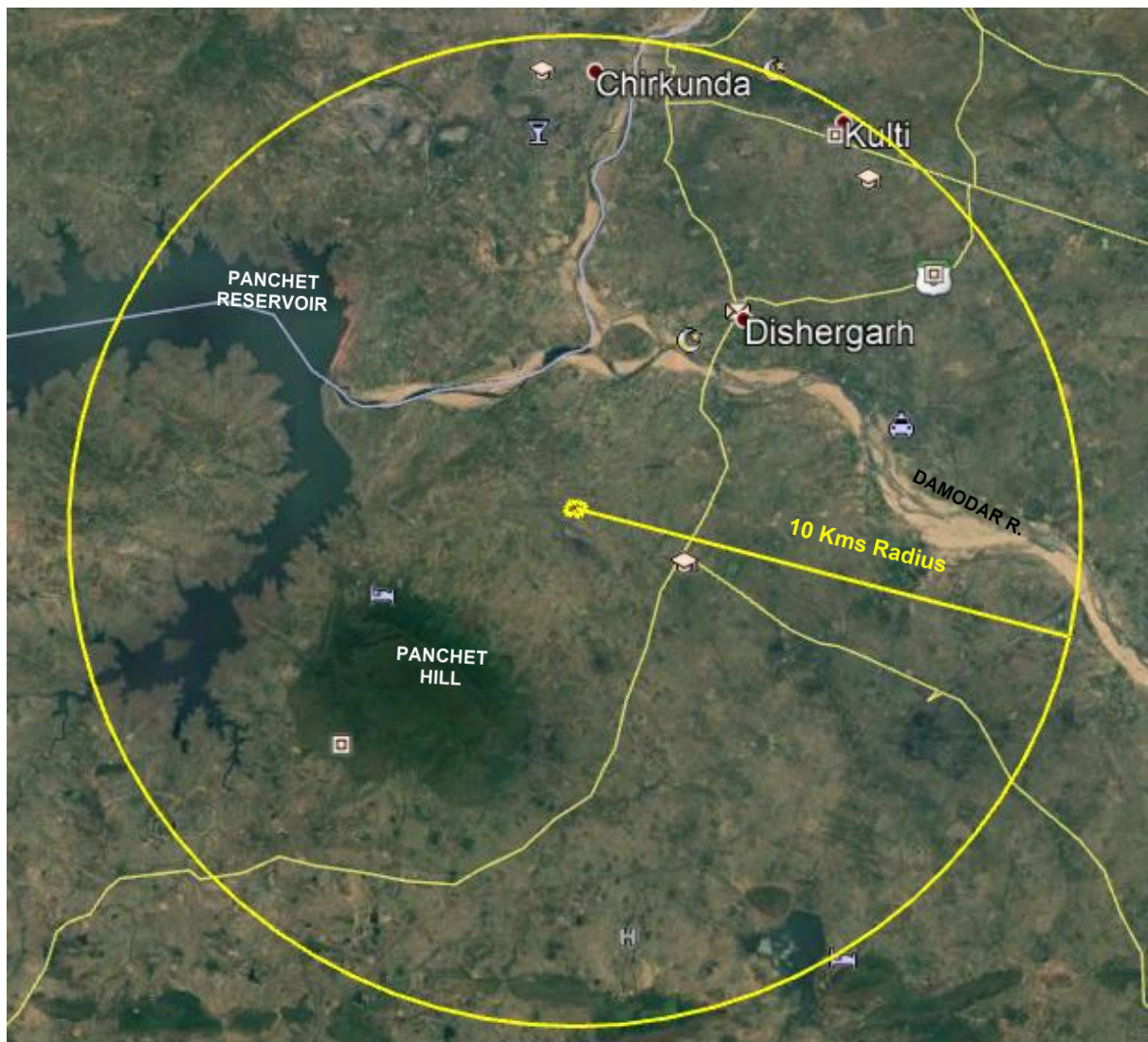


FIGURE-1.4 : 10 KM RADIUS STUDY AREA

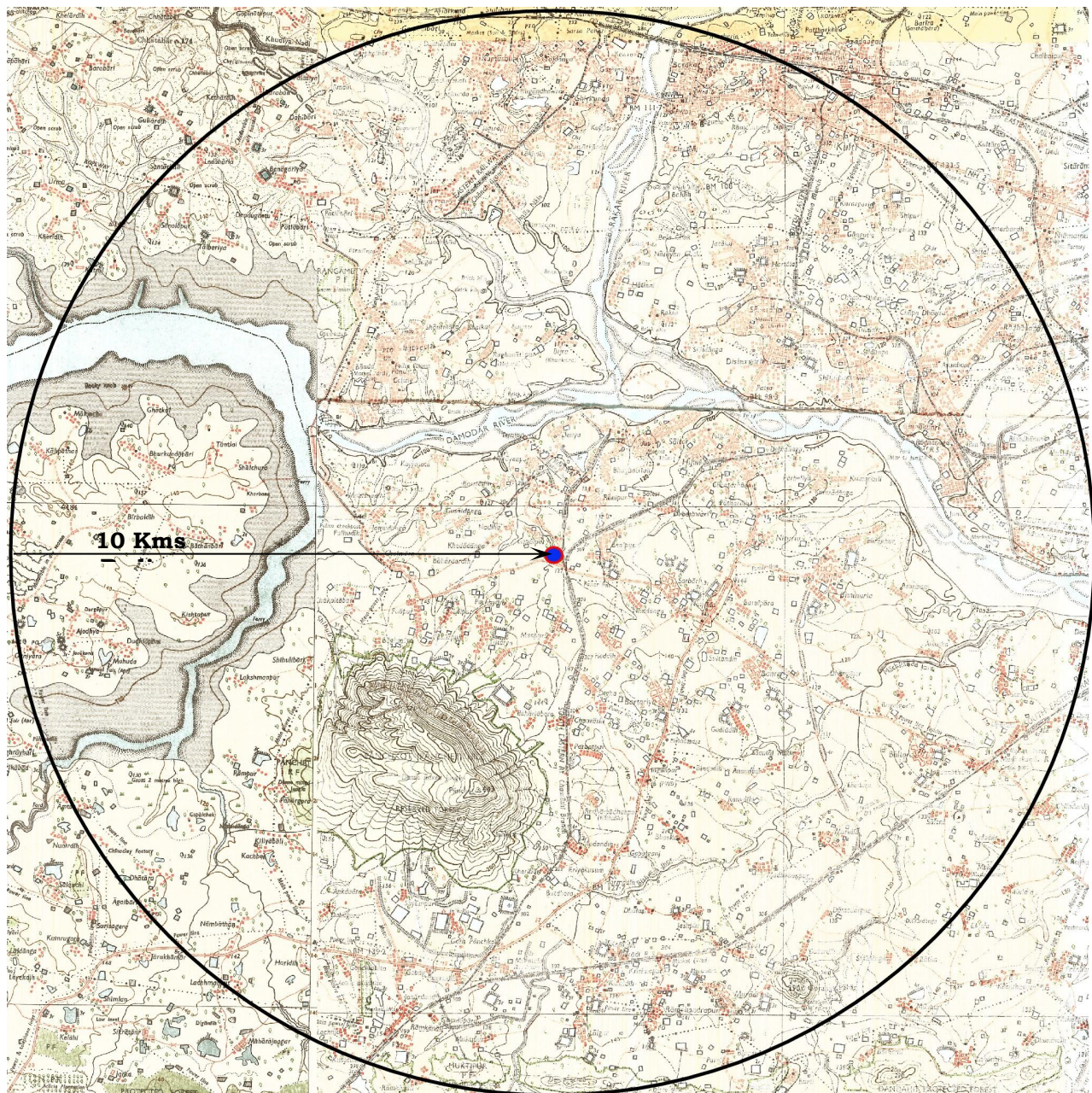


FIGURE-1.5 : TOPOSHEET MAP OF THE STUDY AREA

1.4.4 EXISTING ROAD CONNECTIVITY

Raw materials will be received at plant site by rail/road. The raw materials will first come to Chaurashi Railway siding which is about 11.0 km (by road distance) from the project site, covering the stretches of Sarbari-Panchet Road, State Highway-5 & Birinchinath Dham Road. All these roads are two-lane roads. The road network around the project site is shown in **Figure-1.6**.

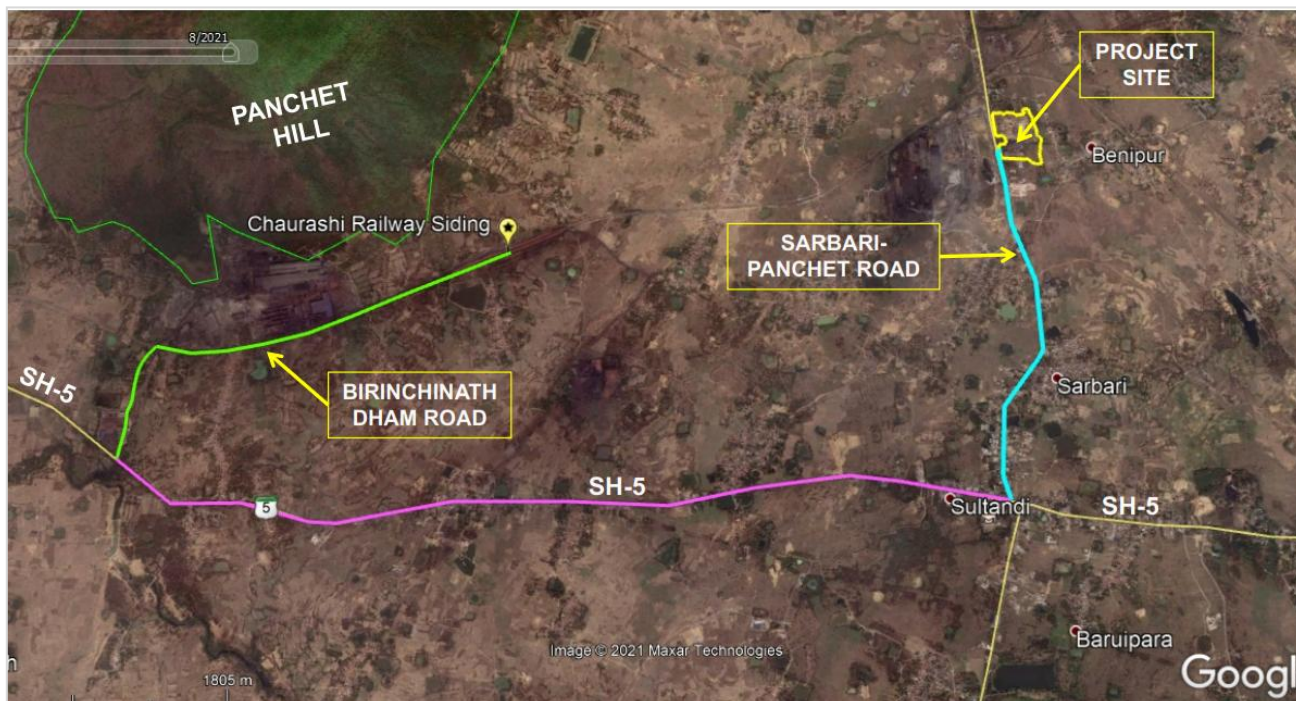


FIGURE-1.6 : ROAD NETWORK NEAR THE PROPOSED PROJECT

The relevant Photographs of Sarbari-Panchet Road, State Highway-5 & Birinchinath Dham Road are presented below.



BIRINCHINATH DHAM ROAD



STAE HIGHWAY-5



SARBARI-PANCHET ROAD

1.5 IMPORTANCE TO COUNTRY & REGION

India was the world's 3rd largest steel producer in the year 2017. Steel industry being a core sector, reflects the overall economic growth in the long term period. The per capita consumption of steel is considered as an important index of the socio-economic development including living standards of the people in any country. All major industrial economies are influenced by the existence of a strong steel industry. The economic growth has been largely shaped by the strength of their steel industries in their initial stages of development.

Post de-regulation the Indian steel industry has been registering manifold development in the context of the buoyant economy and rising demand for steel. Rapid increase in production has made India to become the 2nd largest producer of crude steel during the year 2018, from its 3rd largest status in 2017. The country became the largest producer of sponge iron in the world and the 3rd largest finished steel consumer in the world after USA and China. In a de-regulated, liberal

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economic scenario like India, the role of a government is to formulate policy guidelines to facilitate the institutional structure/mechanism for creating a favourable environment for improving efficiency as well as performance of the steel sector. In this connection, the Government of India has issued the National Steel Policy 2017, which focuses on long term growth for the Indian steel industry, both on demand and supply sides by 2030-31. The Government has also laid down a policy to encourage domestically manufactured Iron & Steel products by providing them with preference in Government procurement. India has set a target to achieve 300 million tonnes of annual steel production by the year 2025-30.

The growth of the steel industry significantly contributes to economic growth of the Nation as well as to the region as it generates employment both directly and also due to development of downstream industries. The infrastructural and other social amenities grow in the region leading to overall development of the region. The proposed expansion project will enhance the overall development of the region.

The proposed expansion project of **M/s. AIC Iron Industries Pvt. Ltd.** will cover new units and technology. The above will lead to manufacture products at a lower cost and more importantly in a more environment friendly way.

1.6 BRIEF LEGAL FRAMEWORK FOR EIA STUDY

1.6.1 Procedure for Environmental Clearance

Environmental clearance of any new project or expansion of existing projects is now done as per the new notification of the Ministry of Environment, Forest and Climate Change (MoEF&CC), Govt. of India dated 14th September 2006. The new notification requires prior environmental clearance of all projects from competent central govt. or state govt. authorities, as may be the case. The projects are now classified into Category “A” or Category “B” projects based on spatial extent of potential impacts on human health and natural & man-made resources. The Category “A” projects require prior clearance by the MoEF&CC, Govt. of India while the Category “B” projects have to get clearance from the State level Environment Impact Assessment Authority (SEIAA), constituted by the Central Government for this purpose.

The environment clearance procedure for new projects will require maximum of four stages all of which may not be applicable to all the projects. These four stages in sequential order are as follows:

Stage 1 - Screening: It refers to the definite assignment of environmental category to projects or activities where the same is not specified. In case of Category 'B' projects scrutiny of application is done at State level to categorize project as B1 or B2. The B2 projects do not require EIA Report. The present project is categorized as Category 'A' project and thus, this stage is not applicable.

Stage 2 - Scoping: It refers to the process by which the Expert Appraisal Committee in the case of Category 'A' project and State-level Expert Appraisal Committee in the case of **B1** Category project decide detailed Terms of Reference addressing all relevant environmental concerns for the preparation of an EIA report in respect of the project for which prior environmental clearance is sought. The ToR for this project was granted on 10th June, 2024.

Stage 3 - Public Consultation: It refers to the process by which concern of local people and other stakeholders are ascertained and their views taken regarding the project. The Public Consultation takes place in two steps: Public hearing and written responses. The public hearing for the proposed expansion project of M/s AIC Iron Industries Pvt. Ltd. will be conducted by West Bengal Pollution Control Board

Stage 4 - Appraisal: This refers to detailed scrutiny by the Expert Appraisal Committee or State Level Expert Appraisal Committee of the application and other documents like the final EIA report. The final EIA report for this project will be prepared after

SCOPE OF THE STUDY
- To conduct literature review and collection of data relevant to study area - Project appreciation in terms of its environmental pollution potential and detrimental impacts on different environmental attributes. - To undertake environmental monitoring so as to establish the baseline environmental status of the study area - To identify existing pollution load due to various activities in the ambient levels - To identify the basic environmental status including the meteorological parameters and socio-economic environment of the proposed study area - To predict incremental levels of pollutants in the study area due to the proposed plant activities - To evaluate the predicted impact on the various environmental attributes in the study area by using scientifically developed and widely accepted environmental impact methodologies - To prepare an environmental management plan outlining the measures for improving the environmental quality for environmentally sustainable development - To identify critical environmental attributes required to be monitored

Public Hearing for the final appraisal by EAC for grant of Environment Clearance.

The steps of Environmental Clearance for the proposed expansion project is shown in **Figure-1.7**.

1.6.2 Post Environmental Clearance Monitoring

For category 'A' project, the project proponent shall make the advertisement through newspapers indicating that the proposed project has been granted environmental clearance (EC) along with the details of MoEF&CC website.

The project proponent shall submit half-yearly compliance reports in respect of the stipulated terms and conditions of prior environmental clearance in both hard & soft copies to the concerned RO of MoEF&CC on 1st June and 1st December of each calendar year. All such reports shall be public documents. The latest such compliance report shall be displayed on the web site of the concerned regulatory authority.

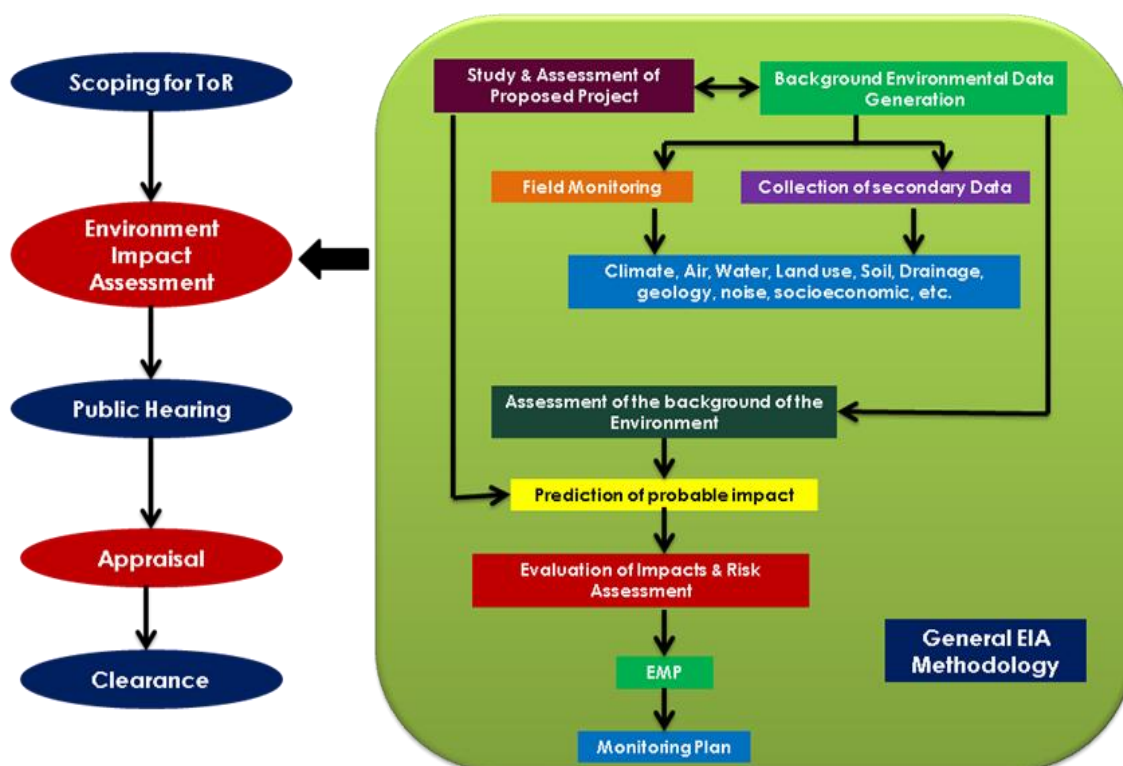


FIGURE 1.7: STEPS OF ENVIRONMENTAL CLEARANCE FOR PROPOSED

1.6.3 Important Environment Legislation

The environmental regulations, legislation and policy guidelines and control that may impact the project are the responsibility of a variety of Government agencies. The principal environmental regulatory agency in India is the Ministry of Environment, Forest and Climate Change (MoEF&CC), New Delhi. MoEF&CC formulates environmental policies and also accords environmental clearances for different projects.

Many State and Central legislation have a bearing on environment but laws on environment protection have been notified recently. These legal enactments can be broadly classified in the terms of focus areas, viz. pollution, natural resources and linkages between pollution and natural resources. The important environmental legislation related to environmental clearance for projects are briefly described in the **Table-1.2.**

The MoEF&CC is the nodal agency to set up policy and standards for the protection of environment, along with Central Pollution Control Board (CPCB). This includes air, noise, water and hazardous waste standards. The relevant standards, which are of significance to the proposed expansion project, are discussed in the section below:

TABLE: 1.2: KEY ENVIRONMENTAL LEGISLATION			
Name	Scope and Objective	Key areas	Operational Agencies/ Key Players
Water (Prevention and Control of Pollution) Act 1974	To provide for prevention & control of water pollution and enhancing water quality	Control of sewage and industrial effluent discharges	Central and State Pollution Control Boards
Air (Prevention and Control of Pollution) Act 1981	To provide for the prevention and control of air pollution	Controls emission and air pollutants	Central and State Pollution Control Boards
Forest Conservation Act 1980	To halt rapid deforestation & resulting environment degradation	Restriction on de-reservation & use of forest for non-forest purpose	Central Government
Environment	To provide for the	An umbrella	Central Govt.

TABLE: 1.2: KEY ENVIRONMENTAL LEGISLATION

Name	Scope and Objective	Key areas	Operational Agencies/ Key Players
Protection Act 1986; Environment Protection Rules 1989.	protection and improvement of environment	Legislation; supplements pollution laws	MoEF&CC, can delegate power to Dept. of Environment
EIA Notification, New Delhi 14 th September, 2006	To provide Guideline for EIA Study	EIA Study	Central Government, nodal agencies MoEF&CC, State governments
Noise Pollution (Prevention & Control) Rules 2000	To control and take measures for abatement of noise and ensure that level does not cross standard	Noise in urban area and around industrial sites	Central Government, nodal agencies MoEF&CC, State governments
Solid Waste Management Rules, 2016	To prescribe procedures for handling and disposal of solid waste	Any facility producing hazardous waste	Central Government, nodal agencies MoEF&CC, State governments
Hazardous Waste (Management, Handling & Transboundary Movement) Rules, 2016	To impose restrictions and prescribe procedures for management, handling and disposal of hazardous waste	Any facility producing hazardous waste	Central and State Pollution Control Boards
Public Liability Insurance Act, 1991	To provide for public liability- insurance for the purpose of providing immediate relief to the persons affected by accident occurring while handling any hazardous substance and for matters connected therewith or incidental thereto	To provide public liability insurance during risk material handling	Central Government, Nodal Agencies MoEF&CC, State Govt.
E-Waste (Management) Rules, 2016	To prescribe procedures for handling and disposal of E-Waste	Any facility producing E-Waste	Central and State Pollution Control Boards

Source: Central Pollution Control Board, New Delhi

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1.6.4 Pollution Standards

The Environment (Protection) Rules 1986 and its subsequent amendments have set certain pollution standards. These standards are generally applicable to air environment, noise environment and water environment.

1.7 SCOPE OF STUDY- DETAILS OF REGULATORY SCOPING CARRIED OUT AS PER TERMS OF REFERENCE

The Environmental Impact Assessment and Environment Management Plan for the proposed expansion project addressing the environment related issues are prepared in accordance with the requirements of terms of reference (TOR) prescribed by MoEF&CC, Govt. of India.

The study evaluates the prevailing environmental conditions. The adverse impacts have been identified and possible mitigation measures have been drawn in order to protect the environment. In order to carry out the study, the baseline environmental scenario has been established.

The main objectives of the present EIA/EMP study are briefly summarized below:

- To establish the baseline environmental scenario.
- To identify, predict and assess the impacts of proposed future project on the environment.
- To prepare a detailed action plan for implementation of mitigative measures.
- To suggest preventive measures to minimize adverse impacts and to maximize beneficial impacts.
- To suggest a monitoring programme to evaluate the effectiveness of mitigative measures.
- To suggest the formation of a core group responsible for implementation of the EMP.
- To prepare a capital cost estimate for environment management plan.
- To address the concerns of disaster management and points raised in public hearing.

The scope of the present study is to conduct EIA covering all the disciplines of environment and field monitoring in relevant disciplines over one full season of 3 (three) months - **March, 2023 to May, 2023**. The EIA report is prepared as per the MoEF&CC Notification dated 14.09.2006 and its subsequent amendments. After completion of the Public Consultation, all the environmental concerns expressed during the Public Consultation process is addressed and appropriate changes in the EIA Report is made accordingly to formulate the EIA Report.

Secondary and primary data collection was done comprising of, but not restricted to the following:

- Long Term Climatic data from Indian Meteorological Department (IMD) for available previous decade.
- Geo-hydrological aspects based on available data from various sources.
- Identification of water bodies, hills, roads etc. within 10 km radius.
- Details of fauna, flora, information in forests, major habitats, sanctuaries, sensitive places within a distance of 10 km from the project site (including forest details).
- Major industries within 10 km radius.
- Historical monuments and sanctuaries within 10 km radius.
- Land use pattern within core zone and buffer zone (10 km radius around the core zone), Cropping pattern.
- Demography and Socio-economic based on last available Census data for entire study area.

The preparation of EIA/EMP has been done as per the generic structure prescribed in EIA Notification dated 14th September 2006.

In line with the TOR, baseline environmental data was generated as shown below in **Table-1.3** :

TABLE-1.3
BASELINE ENVIRONMENTAL DATA FPOR EIA STUDY

Description	No. of Locations
Air Ambient air monitoring (24 hourly samples), twice a week for 3 months for one season Parameters : PM ₁₀ , PM _{2.5} , SO ₂ , NO ₂ & CO (8 hourly samples).	8
Meteorological parameters measured at hourly duration simultaneously at one air monitoring station for 3 months for Wind speed, direction, Relative humidity,	1

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Temperature etc.	
Water Water sample from various surface and ground water in the study area and tested for physical, chemical & biological parameters.	10 (Surface Water) & 9 (Ground Water)
Soil	4
Noise Hourly readings taken for 24 hours (Leq.)	10

1.8 STATUS OF LITIGATIONS

There are no litigations / court cases pending against the project.

CHAPTER-2.0

PROJECT DESCRIPTION

2.1 TYPE OF THE PROJECT

M/s. AIC Iron Industries Pvt. Ltd. is operating a Steel Plant at village: Benipur, P.O. : Saltor, P.S. Neturia, District: Purulia, West Bengal. The company undertook its first manufacturing activity by setting up 1x3 T + 1x6 T Induction Furnaces for production of 28,800 TPA Billets. This was installed as per NOC vide Memo no: 1211-WPBA-NOC(816)/05 dated 09.11.2005 for 1X3 T Induction Furnace and NOC vide Memo no. 498-WPBA-NOC(816)/05 dated 03.05.2010 for 1X6 T Induction Furnace. The units are in operation and producing 28,800 TPA Billets as per CTO vide Consent Memo No. 194-WPBA/Red/Prt/Cont/216/07 dated 04.05.2023, valid till 31.03.2028 has been obtained for the above mentioned facilities.

Meanwhile the Company obtained an Environmental Clearance (EC) vide File No. J-11011/566/2008-IA-II-(I) dated 27.08.2010 and subsequently, installed 1x15 T Induction Furnace based on this EC. Thus, 1x3 T + 1x6 T + 1x15 T Induction Furnaces is under operation for ultimate production of 78,300 TPA Billets. The Company is also obtained an Environmental Clearance (EC) vide File No. J-11011/566/2008-IA-II-(I) dated 04.01.2023 for installation of 1x400 TPD DRI Kiln to produce 1,32,000 TPA Sponge Iron, 3x15 T Induction Furnaces with matching LRF & CCM to produce 1,46,000 TPA billets for increasing the capacity of Steel Melting Shop, 0.192 MTPA Rolling Mill with 1x15 TPH Reheating Furnace for production of Structural Steels (Angles, Channels, Joist, TMT Bars, Wire Rod, Strips & Pipes etc.) and 20 MW capacity Captive Power Plant (10 MW WHRB + 10 MW AFBC) within the existing plant premises at Village - Benipur, P.O.: Saltor, Dist. Purulia in West Bengal. **As per EC dated 04.01.2023, 1x400 TPD DRI Kiln, 1x15 T Induction Furnace, Rolling Mill of capacity 24,000 TPA for production of Structural Steels (Strips & Pipes etc.) along with 10 MW capacity Captive Power Plant (WHRB based) are installed.** Remaining units as per latest EC, 2023 is under implementation stage or to be implemented.

Now, to make the project more viable, the company has also decided to install 1X0.5 MTPA capacity Sinter Plant, 1X500 M³ capacity MBF, 3x650 TPD DRI Kilns (6,43,500 TPA Sponge Iron), 6x25 T Induction Furnaces, 1x25 T Electric Arc Furnaces along with 1x15 TPH Slag Crusher unit,

M/s. AIC Iron Industries Pvt. Ltd.	Environmental Impact Assessment for Proposed expansion of existing Steel Plant at village: Benipur, P.O.: Saltor, P.S.: Neturia, Dist: Purulia, West Bengal.	C2 - 2
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Enhancement (through optimization in operation) the production capacity of 4x15 T + 2X10 T Induction Furnaces (as per EC 2010 & 2023), 3x12 MVA capacity Submerged Arc Furnaces, 1x0.3 MTPA capacity Rolling Mill, Lime Plant (250 TPD), Oxygen Plant (225 TPD), 1x0.5 MTPA capacity Ductile Iron Pipe (DIP) Plant, 60,000 TPA capacity Galvanising Unit along with 4x4000 Nm³/Hr capacity Producer Gas Plant and 100 MW capacity Captive Power Plant (70 MW WHRB + 30 MW AFBC/CFBC) within the existing plant premises at Village - Benipur, P.O.: Saltor, Dist. Purulia in West Bengal.

The existing as well as proposed units with rated capacity per annum are presented in **Table-2.1**.

M/s. AIC Iron Industries Pvt. Ltd.	Environmental Impact Assessment for Proposed expansion of existing Steel Plant at village: Benipur, P.O.: Saltor, P.S.: Neturia, Dist: Purulia, West Bengal.	C2 - 3
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TABLE-2.1
OVERALL PROJECT SCENARIO

Sl. No.	Name of the Units	Units as per NOC from WBPCB	Units as per EC dated 27.08.2010	Units as per EC dated 04.01.2023	Units under Operation	Units under Implementation / To be Implemented	Proposed Units	Overall Project Scenario
1	Sinter Plant	-	-	-	-	-	1X0.5 MTPA (1x70 M ²) Sinter	1X0.5 MTPA (1x70 M ²) Sinter
2	Mini Blast Furnace (MBF) Plant	-	-	-	-	-	1X500 M ³ (5,00,000 TPA Liq. Metal)	1X500 M ³ (5,00,000 TPA Liq. Metal)
3	Sponge Iron Plant	-	4x100 TPD DRI Kilns (1,20,000 TPA Sponge Iron) (Dropped)	1x400 TPD DRI Kiln (1,32,000 TPA Sponge Iron)	-	1x400 TPD DRI Kiln (1,32,000 TPA Sponge Iron)	3x650 TPD DRI Kilns (6,43,500 TPA Sponge Iron)	1x400 TPD + 3x650 TPD DRI Kilns (7,75,500 TPA Sponge Iron)
4	Induction Furnaces with matching CCM & Slab Caster	1x3 T + 1x6 T (28,800 TPA Billets) (As per NOC from WBPCB)	2x15 T (90,000 TPA Billets) (1x15 T Installed & 1x15 T dropped)	3x15 T + 2x10 T (2,10,500 TPA Billets) (Existing 1x3 T + 1x6 T IFs shall be replaced by 2x10 T IFs)	(1x3 T + 1x6 T) # + (1x15 T) (as per EC 2010) + (1x15 T) (as per EC 2023) (28,800 TPA + 45,000 TPA + 48,667 TPA = 1,22,467 TPA Billets)	2x15 T + 2x10 T (1,61,833 TPA Billets) (Existing 1x3 T + 1x6 T IFs shall be replaced by 2x10 T IFs)	6x25 T (New) (6,17,400 TPA Billets) along with 1x15 TPH Slag Crusher unit And Enhancement (through optimization in operation) the production capacity of 4x15 T + 2X10 T (as per EC 2010 & 2023) from 2,55,500 TPA to 3,29,280	6x25 T (New) (6,17,400 TPA Billets) along with 1x15 TPH Slag Crusher unit And Enhancement (through optimization in operation) the production capacity of 4x15 T + 2X10 T (as per EC 2010 & 2023) from 2,55,500 TPA to 3,29,280 TPA Billets (Total 9,46,680 TPA Billets) with matching LRF, CCM & Slab Caster)

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							TPA Billets (Total 9,46,680 TPA Billets) with matching LRF, CCM & Slab Caster)	
5	Electric Arc Furnaces with matching LRF/15 T capacity VOD (@24 Heats, 330 Working Days) & CCM	-	-	-	-	-	1x25 T (1,94,000 TPA Billets) with matching LRF/15 T capacity VOD	1x25 T (1,94,000 TPA Billets) with matching LRF/15 T capacity VOD
6	Ferro Alloy plant and 20 TPH Chrome Ore Briquetting Plant	-	-	-	-	-	3x12 MVA (65,600 TPA Si-Mn or 88,800 TPA Fe-Mn or 30,400 TPA Fe-Si or 67,200 Low Carbon Fe-Cr)	3x12 MVA (65,600 TPA Si-Mn or 88,800 TPA Fe-Mn or 30,400 TPA Fe-Si or 67,200 Low Carbon Fe-Cr)
7	Rolling Mill	-	-	1,92,000 TPA Structural Steels (Angles, Channels, Joist, TMT Bars, Wire Rod, Strips & Pipes etc.) with 1x15 TPH Reheating Furnace	24,000 TPA Structural Steels (Strips & Pipes etc.)	1,68,000 TPA Structural Steels (Angles, Channels, Joist, TMT Bars, Wire Rod, Strips & Pipes etc.) with 1x15 TPH Reheating Furnace	1x0.3 MTPA TMT bars, Wire Rod, Structural etc. with 1x25 TPH Reheating Furnace (Optional)	0.192 MTPA + 1X0.3 MTPA Structural Steels (Angles, Channels, Joist, TMT Bars, Wire Rod, Strips & Pipes etc.) with 1x15 TPH + 1x25 TPH (Optional) Reheating Furnaces

M/s. AIC Iron Industries Pvt. Ltd.	Environmental Impact Assessment for Proposed expansion of existing Steel Plant at village: Benipur, P.O.: Saltor, P.S.: Neturia, Dist: Purulia, West Bengal.	C2 - 5
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8	Lime Plant	-	-	-	-	-	1x250 TPD Quicklime	1x250 TPD Quicklime
9	Oxygen Plant	-	-	-	-	-	1x225 TPD Liquid Oxygen	1x225 TPD Liquid Oxygen
10	Ductile Iron Pipe (DIP) Plant	-	-	-	-	-	1X0.5 MTPA Ductile Iron Pipe	1X0.5 MTPA Ductile Iron Pipe
11	Galvanising Unit	-	-	-	-	-	60,000 TPA	60,000 TPA
12	Producer Gas Plant (PGP)	-	-	-	-	-	4x4000 Nm ³ /Hr (16,000 Nm ³ /Hr) Producer Gas	4x4000 Nm ³ /Hr (16,000 Nm ³ /Hr) Producer Gas
13	Captive Power Plant	-	12 MW CPP (8 MW WHRB + 4 MW AFBC) (Dropped)	20 MW CPP (10 MW WHRB + 10 MW AFBC)	10 MW CPP (WHRB)	10 MW CPP (AFBC)	100 MW CPP (70 MW WHRB + 30 MW AFBC/CFBC)	120 MW CPP (80 MW WHRB + 10 MW AFBC + 30 MW AFBC/CFBC)

Note:

Induction Furnace: 12 Heats per day & 350 working days per year.

Existing (1x3 T+1x6 T) Induction Furnaces will be replaced by 2x10 T Induction Furnaces.

The proposed project is listed at Sl. Nos. 3(a) & 1(d) under category 'A' of Schedule of EIA Notification, 2006.

M/s. AIC Iron Industries Pvt. Ltd.	Environmental Impact Assessment for Proposed expansion of existing steel plant at Village: Benipur, P.O.: Saltor, P.S.: Neturia, Dist: Purulia, West Bengal	C2 - 6
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The principal features or highlights of the proposed expansion project of **M/s AIC Iron Industries Pvt. Ltd.**, under study are as follows:

Location	Village: Benipur, P.O. : Saltore, P.S. Neturia, District: Purulia, West Bengal
Land requirement	The proposed project will be installed on the available land within the existing plant area as well as on the additional land adjacent to its existing plant premises comprising of total 30.25 Hectares (74.74 Acres) land. Out of the total land of 30.25 Hectares (74.74 Acres), 20.82 Hectares (51.44 acres) private land are already acquired. The remaining 9.43 Hectares (23.30 acres) is in the process of Acquisition.
Raw water requirement & source	Total Daily make up Water requirement - 3,834.5 Cu.m/day (Existing Units & Units under Implementation / To be implemented – 509.5 Cu.m/day, Proposed Units - 3325 Cu.m/day) (Fresh Water - 3134.5 Cu.m/day & Treated Waste Water - 700 Cu.m/day) Source: Damodar River through DVC supply.
Power requirement & source	Requirement : Total 223.5 MW (Existing Units and Units under Implementation / To be implemented – 41.5 MW & Proposed Units - 182 MW) Source: Captive Power Plant & DVC supply.
Effluent generation & disposal	Zero Liquid Discharge concept shall be adopted. Waste water, generated from the project will be re-used after necessary treatment as per the present practice. The entire treated waste water will be reused for various purposes inside the plant. Domestic waste water will be treated in the proposed Sewage Treatment Plant (STP). The treated water will be used for gardening purpose inside the plant.
Air pollution control	Adequate control measures like Electrostatic Precipitators (ESPs), bag filters, Wet Scraber, Cyclone Separators, dust suppression system & Stacks of adequate height at relevant points will be installed to control air pollution to meet the prescribed standards.
Solid Waste Management (Existing + Proposed)	• Dust collected from ESP & bag filter of Sinter Plant and of other units will be reused for sinter making. • Blast Furnace Slag will be used in cement manufacturing. • Dolochar from the existing & the proposed DRI units will be used in AFBC Boiler for power generation.

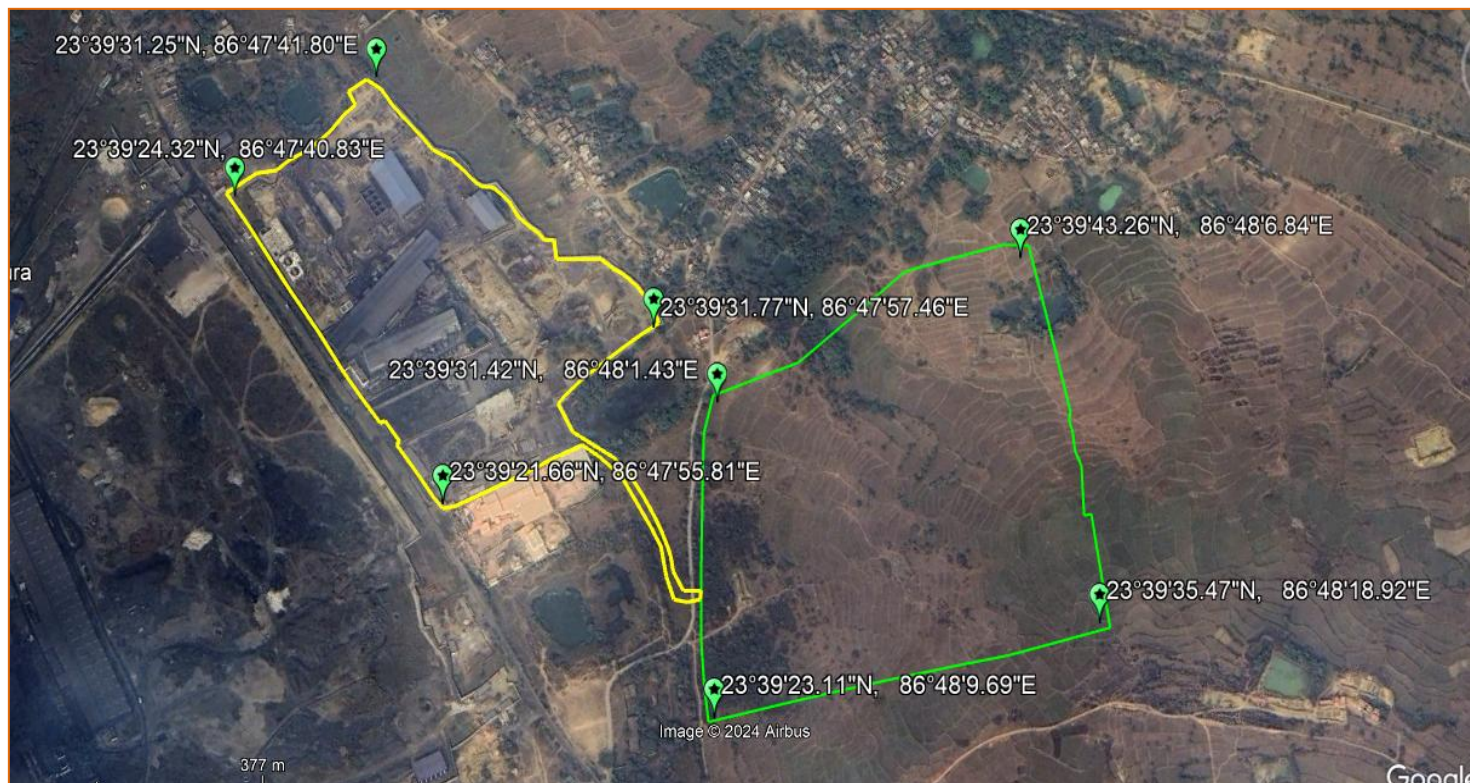
M/s. AIC Iron Industries Pvt. Ltd.	Environmental Impact Assessment for Proposed expansion of existing steel plant at Village: Benipur, P.O.: Saltor, P.S.: Neturia, Dist: Purulia, West Bengal	C2 - 7
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	• The hot slag generated from Induction Furnaces/Electric Arc Furnace will be transferred to slag yard after cooling. Slag from Furnaces after metal recovery in metal recovery plant (slag crusher) will be used for Construction purpose. • Solid wastes that will be generated from CCM as well as Rolling Mill are the scales, end cuts, miss rolls will be used in Induction Furnaces/Electric Arc Furnaces. • Magnesium dust from DI pipe plant will be used in Sinter Plant. • Cement slurry from DI pipe plant will be used Brick making and also in Cement Plant. • Core sand in Casting Area as well as the same from the Annealing Furnace will be used in Land Filling and reclamation. • Zinc Dust/Ash & Dross will be sold to SPCB certified Paint manufacturer. • Tar Sludge from Producer gas plant will be sold to SPCB authorized vendor. • Calcined lime fines will be used in sinter plant. • Slag generated during Ferro Manganese production will be used as a raw material for Silico Manganese production. • Slag generated during Silico Manganese will be used for road construction / land filling after metal recovery. • Ferro Silicon Slag will be used in cement industries as a raw material & used for medium carbon silico manganese production purpose. • Ferro Chrome Slag will be used for road construction or land filling purposes after chrome recovery and after TCLP test. • Fly ash generated from Captive Power Plant will be utilized as raw material for the cement plant/Brick Manufacturing. • Bottom ash generated from the captive power plant will be used for land filling/Road construction purpose. • Solid waste of domestic / commercial origin generated in the plant will be disposed of suitably in consultation with the concerned Civic body.
Manpower	➤ Existing : 300 (80 Permanent and 220 Contractual) ➤ Units under Implementation/To be implemented : Around 210 (40 permanent and 170 contractual) ➤ Proposed : 1600 (300 Permanent and 1300 Contractual) Total : 2110
Project cost	Rs. 1652 Crores

2.2 LOCATION OF THE PROJECT SITE

The project site for proposed expansion project is located at Village : Benipur, P.O. : Saltor, P.S. : Neturia, Dist. : Purulia in the state of

West Bengal. Geographical Co-ordinates of the Project Site are ranged from Latitude: 23°39'21.74"N to 23°39'43.56"N and Longitude: 86°47'39.81"E to 86°48'19.26"E with Elevation is about 160 m (524 ft) Above Mean Sea Level (AMSL). Geographical Co-ordinates of all the four corners of the project site are as follows:



SURROUNDINGS OF THE PROJECT SITE:

The nearest Railway Station - Muradi Railway Station is located about 7.2 Kms towards south-south-east direction from the project site. The State Highway-5 (SH-5) (Rupnarayanpur - Junput) is passing around 2.2 Kms towards east-south-east direction w.r.t. the project site. The G.T. Road (National Highway-2) (Delhi - Kolkata) is passing around 8.7 Kms towards north-north-east direction w.r.t. the Project Site. The proposed project site area is well developed and has all necessary infrastructure facilities such as motorable road upto the plant site, nearness to rail head, telephone facilities etc.

The Nearest Town - Kulti is located about 10 Kms towards north-east direction from the Project site. Industrially developed city - Asansol is located about 16 Kms towards east direction w.r.t. the Project site.

Puruliya, the District Headquarter is located around 57 Kms in south-west direction from the project site.

The nearest distance of Damodar River is around 2.8 km towards north-west direction w.r.t. the Project Site. There is a major forest i.e., Panchet Forest located on the Garh Panchkot Hill within the study area. The nearest distance of the Panchet forest/Garh Panchkot Hill is around 3.2 Km in south-west direction w.r.t proposed project site.

The nearest Airport - Kazi Nazrul Islam Airport, Andal is located about 46 Kms in east direction w.r.t. the project site and the Netaji Subhas Chandra Bose International (NSCBI) Airport, Kolkata is located around 202 Kms in south-east direction from the project site.

The 10 km radius study area on 4 Toposheets (73(I/9, I/10, I/13 & I/14), Scale - 1:50,000) are also shown in **Figure-2.1**.

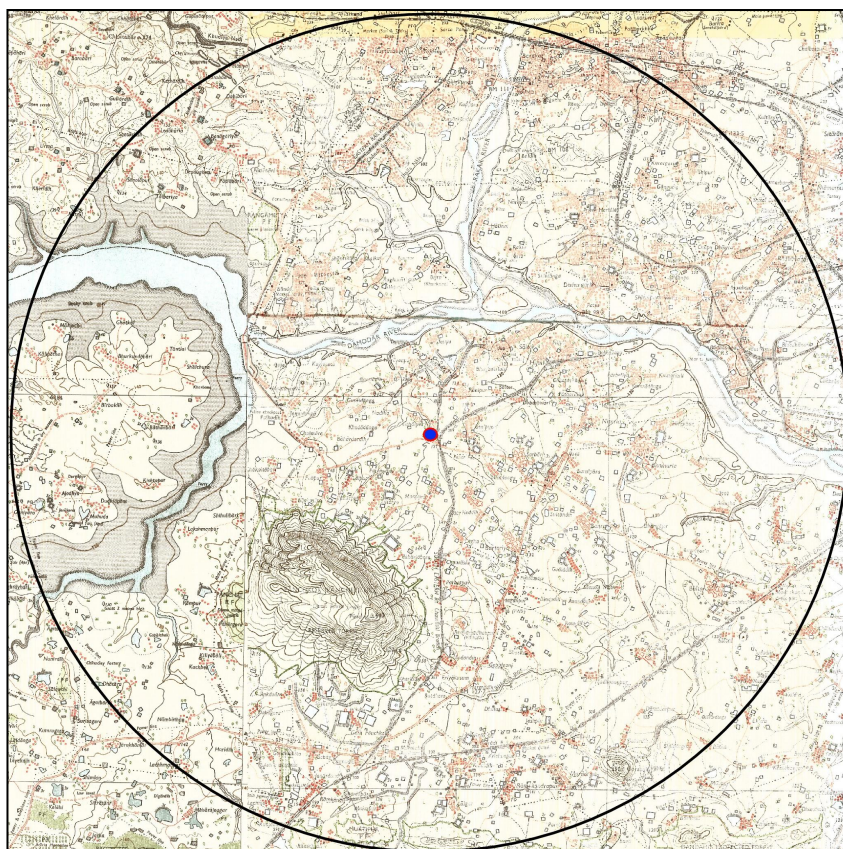


FIGURE-2.1 : TOPOSHEET MAP OF THE STUDY AREA

The plant layout showing the proposed facilities with 33% Greenbelt area has been shown as **Figure-2.2**. The Contour Map and Drainage along with road map of the Project Site is presented as **Figure-2.3**.

FIGURE-2.2 : PLANT LAYOUT

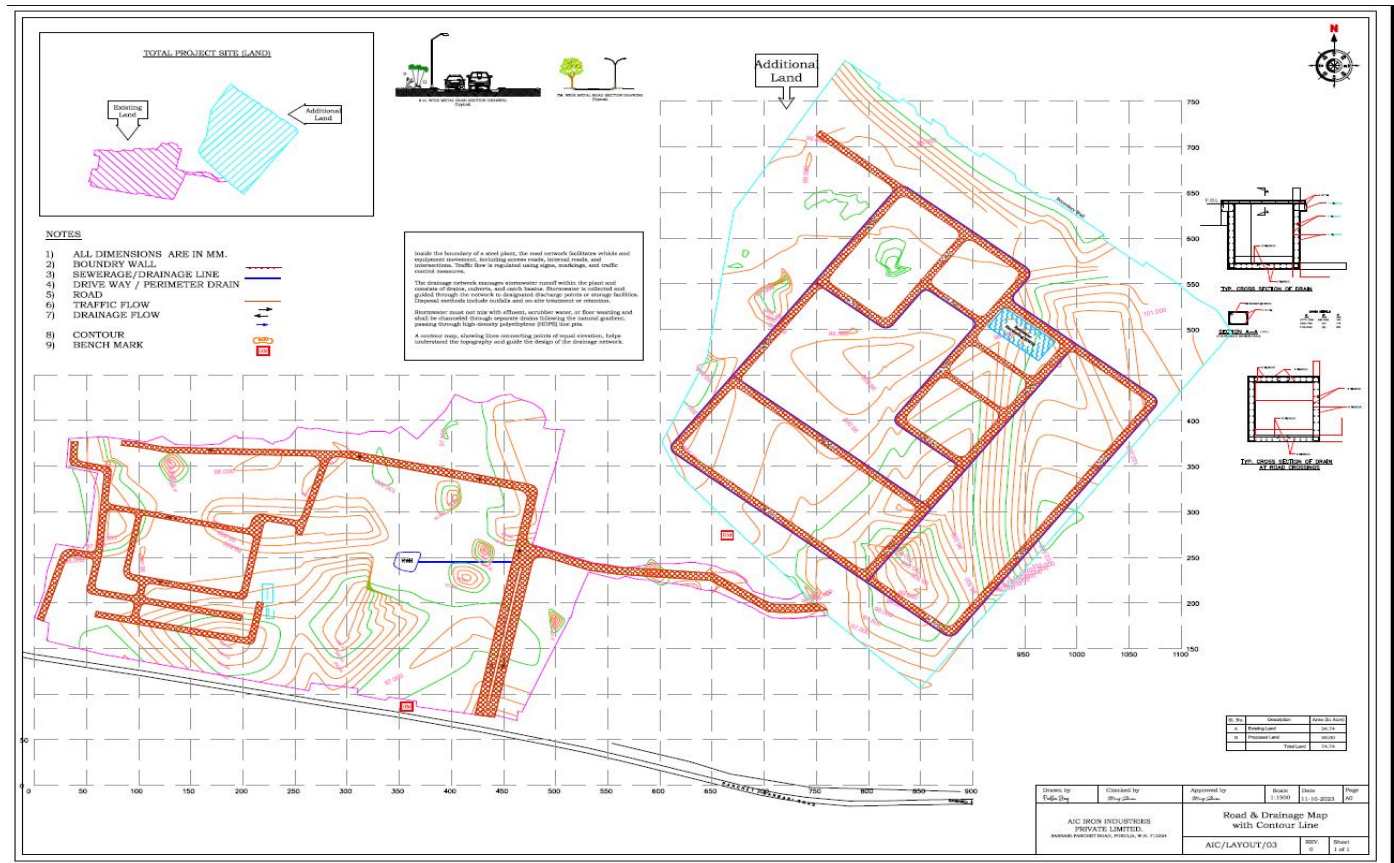


Figure-2.3 : Drainage cum Road Map of the Project Site

2.4 SIZE OF THE PROJECT

M/s. AIC Iron Industries Pvt. Ltd. is planned to expand its existing steel plant by installation of 1X0.5 MTPA capacity Sinter Plant, 1X500 M³ capacity MBF, 3x650 TPD DRI Kilns (6,43,500 TPA Sponge Iron), 6x25 T Induction Furnaces, 1x25 T Electric Arc Furnaces along with 1x15 TPH Slag Crusher unit, Enhancement (through optimization in operation) the production capacity of 4x15 T + 2X10 T Induction Furnaces (as per EC 2010 & 2023), 3x12 MVA capacity Submerged Arc Furnaces, 1x0.3 MTPA capacity Rolling Mill, Lime Plant (250 TPD), Oxygen Plant (225 TPD), 1x0.5 MTPA capacity Ductile Iron Pipe (DIP) Plant, 60,000 TPA capacity Galvanising Unit along with 4x4000 Nm³/Hr capacity Producer Gas Plant and 100 MW capacity Captive Power Plant (70 MW WHRB + 30 MW AFBC/CFBC) within the existing plant premises at Village - Benipur, P.O.: Saltor, Dist. Purulia in West Bengal.

The existing as well as proposed units with rated capacity per annum are presented in **Table-2.1**.

2.5 PROJECT IMPLEMENTATION PERIOD

The installation of several production units along with utilities and services require co-operation for procurement of equipment, equipment foundations, award of all contracts and supervision of all construction jobs at plant site. The factors which are responsible for timely implementation of the project are :

- Arrangement of proper finance for the project,
- Finalization of layout of the proposed plant,
- Design of utilities and services,
- Placement of orders for plant and machinery,
- Arrangements for Govt. sanctions and supply of power, and
- Recruitment of personnel.

As per an initial estimate around 36 months will be needed for implementation of the project.

2.6 RAW MATERIAL DETAILS & MATERIAL BALANCE DIAGRAM

The major raw material, which will be handled, consists of Iron Ore, Pellet, imported coal, Pig Iron, dolomite, Ferro Alloys etc. The annual requirement of major raw materials, which will be required additionally for the proposed project, is presented in **Table-2.2**.

TABLE-2.2
LIST OF RAW MATERIALS

Sl. No	Raw Material	Annual Requirement (in TPA)				Source
		Existing	Under Implementation / To be implemented	Proposed	Total	
Sinter Plant (1x0.5 MTPA)						
1	Iron Ore Fines	-	-	4,77,430	4,77,430	Orissa, Barbil
2	Limestone	-	-	42,430	42,430	Local Market
3	Quicklime	-	-	16,514	16,514	Local Market
4	Dolomite	-	-	21,428	21,428	Local Market
5	Coke	-	-	31,000	31,000	Local Market

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Mini Blast Furnace (1x500 M³)						
1	Sinter	-	-	5,00,000	5,00,000	In House
2	Iron Ore Lump	-	-	35,000	35,000	Orissa, Barbil
3	Pellet	-	-	1,42,860	1,42,860	Local Market
4	Coke	-	-	18,570	18,570	Local Market
5	PCI Coal	-	-	84,285	84,285	Local Market
6	Limestone	-	-	12,857	12,857	Local Market
7	Dolomite	-	-	26,428	26,428	Local Market
8	Quartzite	-	-	26,428	26,428	Local Market
Sponge Iron Plant (7,75,500 TPA Sponge Iron)						
1	Pellet	1,87,250	-	9,12,750	11,00,000	In House
2	Iron Ore	18,400	-	89,600	1,08,000	Orissa, Barbil
3	Coal	1,25,400	-	6,11,300	7,36,700	Imported
4	Dolomite	4,650	-	22,550	27,200	Local Market
Induction Furnaces (9,46,680 TPA Billets)						
1	Sponge Iron	-	-	8,69,580	8,69,580	In House / Local Market
2	Pig Iron	-	-	1,42,982	1,42,982	Local Market
3	Scrap	-	-	2,03,088	2,03,088	Local Market
4	Ferro Alloy	-	-	7353	7353	In House
Electric Arc Furnaces (1,94,000 TPA Billets)						
1	Sponge Iron	-	-	95000	95000	Local Market
2	Pig Iron	-	-	118800	118800	Local Market
3	Scrap	-	-	23750	23750	Local Market
4	Ferro Alloy	-	-	500	500	Local Market
5	Lime	-	-	25250	25250	Local Market
Rolling Mill (0.492 MTPA)						
1	Billets	1,95,850		3,06,000	5,01,850	In House
Ductile Iron Pipe (DIP) Plant (0.5 MTPA)						
1	Hot Metal	-	-	5,00,000	5,00,000	In House
2	Zinc	-	-	3,500	3,500	Local Market
3	Scrap	-	-	55,000	55,000	Local

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						Market
Producer Gas Plant (16,000 Nm³/Hr)						
1	Coal	-	-	70,400	70,400	Local Market
Captive Power Plant (AFBC / CFBC)						
1	Dolo Char	-	30,000	2,32,000	2,62,000	In House
2	Coal	-	62,500	91,000	1,53,500	Local Market
Ferro Alloy plant : Ferro-Manganese (88,800 TPA)						
1	Manganese Ore	-	-	2,30,880	2,30,880	Orissa
2	Dolomite	-	-	2,664	2,664	Local Market
3	Coke	-	-	35,520	35,520	Local Market
4	Coal	-	-	35,520	35,520	Local Market
Ferro Alloy plant : Silico - Manganese (65,600 TPA)						
1	Manganese Ore	-	-	1,11,510	1,11,510	Orissa
2	Dolomite	-	-	41,626	41,626	Local Market
3	Coke	-	-	26,240	26,240	Local Market
4	Coal	-	-	26,240	26,240	Local Market
5	Quartzite	-	-	46,644	46,644	Local Market
6	Ferro Manganese Slag	-	-	88,800	88,800	In House
Ferro Alloy plant :Ferro - Silicon (30,400 TPA)						
1	Quartz	-	-	51,680	51,680	Local Market
2	Mill Scrap	-	-	13,072	13,072	Local Market
3	M S Scrap	-	-	608	608	Local Market
4	Charcoal	-	-	27,360	27,360	Local Market
5	Lam Coke	-	-	16,720	16,720	Local Market
Ferro Alloy plant : Low Carbon Ferro - Chrome (67,200 TPA)						
1	Chrome Ore	-	-	1,16,480	1,16,480	Orissa
2	Coke	-	-	17,920	17,920	Local Market
3	Coal	-	-	8,064	8,064	Local Market
4	Quartz	-	-	896	896	Local Market
5	Dolomite	-	-	896	896	Local

M/s. AIC Iron Industries Pvt. Ltd.	Environmental Impact Assessment for Proposed expansion of existing steel plant at Village: Benipur, P.O.: Saltor, P.S.: Neturia, Dist: Purulia, West Bengal	C2 - 15
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						Market
6	Lime	-	-	1,120	1,120	Local Market
7	Molasses	-	-	2,688	2,688	Local Market

The Geo-chemical analysis of trace elements in various raw materials have been presented below in **Tables - 2.3**.

TABLE - 2.3

A) Geochemical Analysis of Trace Elements of Iron Ore		
Sl.no	Test Parameter	Iron ore Sample Result obtained (% by mass)
1	Iron as Fe	58-62.3
2	Sulphur as S	Trace
3	Silica (SiO ₂)	2.28
4	Alumina(Al ₂ O ₃)	1.7
5	Phosphorous (P)	0.05
6	Moisture	6.0
7	LOI	3.2
Trace Metals		ppm
1	Chromium as Cr	23.4
2	Nickel as Ni	7.4
3	Arsenic as As	2.9
4	Lead as Pb	2.5
5	Zinc as Zn	9.3
6	Mercury as Hg	<0.1
7	Selenium as Se	0.1

B) Geochemical Analysis of Trace Elements of Coal		
Sl. No.	Parameters	Range (ppm)
1	Co	17.0 – 36.5
2	Cu	66.0 – 105.0
3	Cr	55.0 – 58.5
4	Mn	745.0 – 935.0
5	Ni	59.0 – 78.0
6	Pb	18.5 – 22.0
7	As	4.0 – 5.0

C) Geochemical Analysis of Trace Elements of Dolomite		
Sl.No.	Parameters	Range (ppm)

1	Mn	286.74 ± 0.99
2	Zn	50.33 ± 0.1
3	Pb	24.00 ± 0.36
4	Cd	3.86 ± 0.3
5	Al	<10.00
6	Ni	<0.5
7	As	4.2 ± 0.3

Raw materials will be received at plant site by rail/road. All the trucks for raw material and finished product transportation shall comply with the applicable environmental norms. The Material Balance diagram for the proposed expansion project is depicted in **Figure-2.5**.

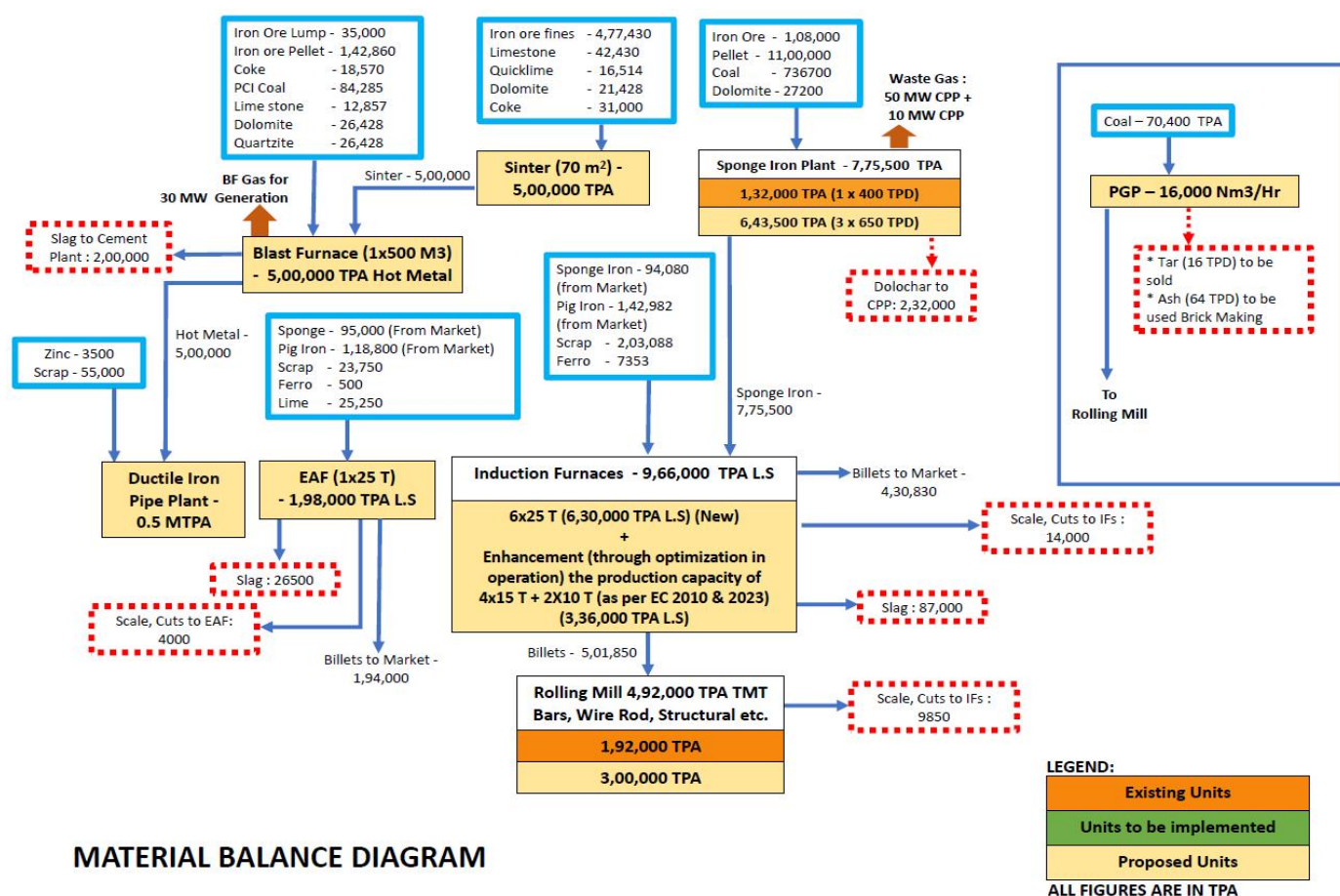


Figure-2.5(a): Material-cum-Process Flow Diagram of Overall Steel Plant

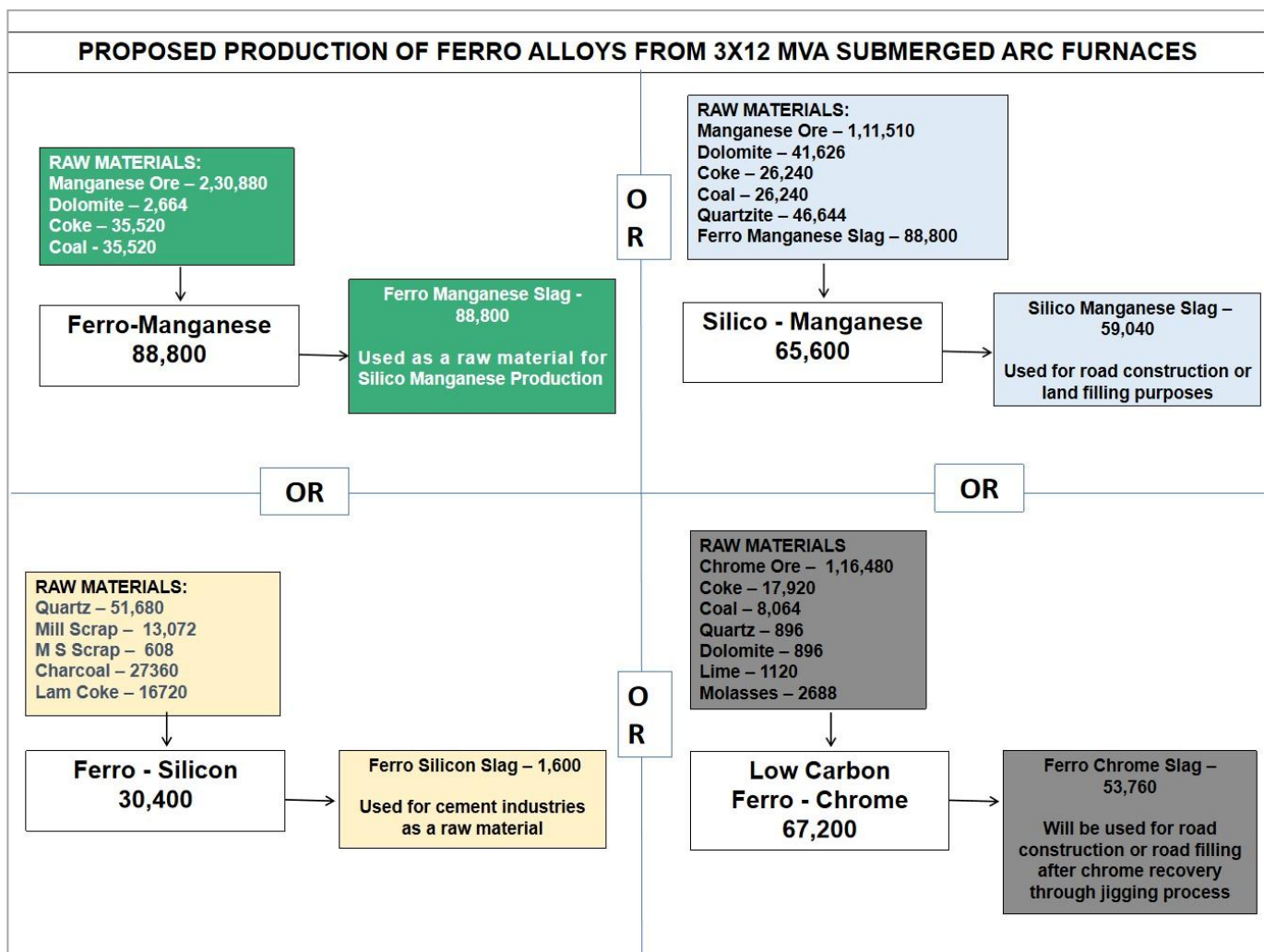


Figure-2.5(b): Material-cum-Process Flow Diagram of Proposed 3x12 MVA Submerged Arc Furnaces

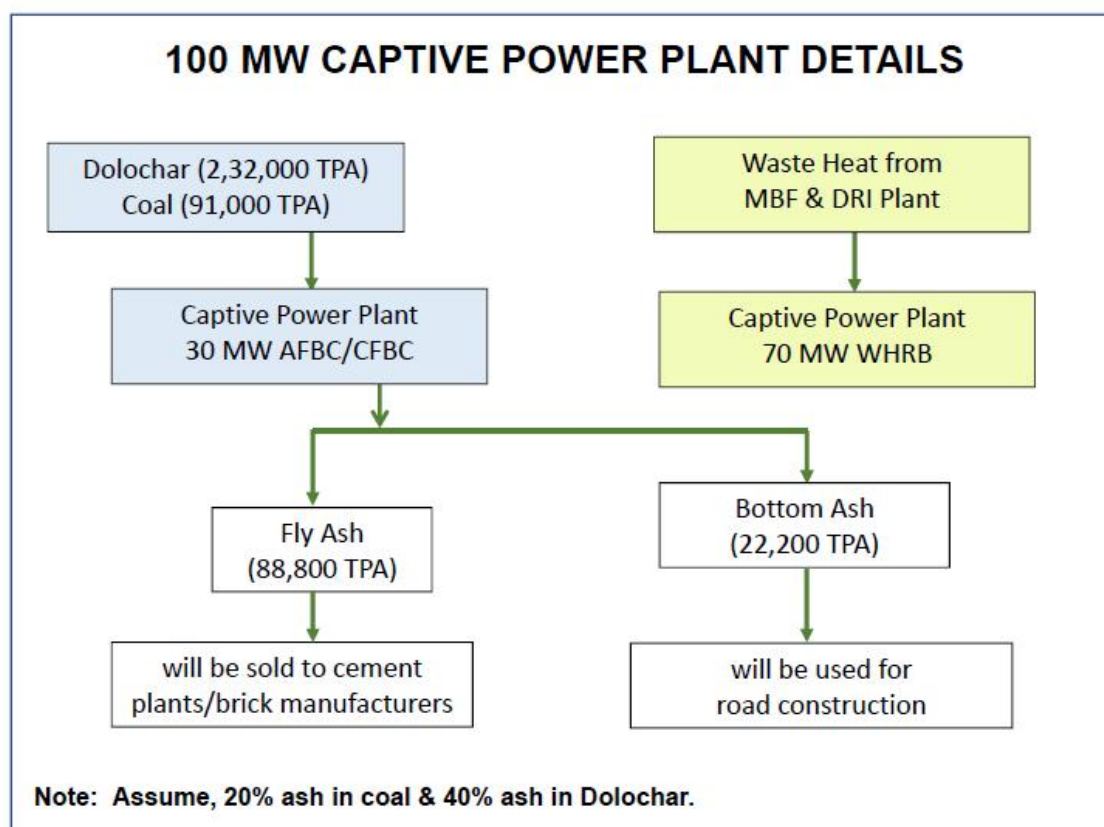


Figure-2.5(c) : Material-cum-Process Flow Diagram of Overall Captive Power Plant based on AFBC Boilers

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2.7 TECHNOLOGY & PROCESS DESCRIPTION

2.7.1 SINTER PLANT

To meet the requirement of its forward integration and financial viability, the Company has decided to install a Sinter Plant of capacity 1X0.5 MTPA (1x70 M²) to produce Sinter to use it as raw material for iron making.

The sinter plant complex will consist of sinter machine along with associated services facilities. The sinter plant complex will consist of the following units,

1. Storage and proportioning unit
2. Combined mixing and balling unit
3. Sintering and cooling unit
4. Waste gas unit
5. Main exhaust fan unit
6. Cold sinter screening unit
7. Plant dedusting unit

The above units will be interconnected by conveyor galleries and junction houses for conveying raw fix, finished sinter, and sinter return fines. All the iron bearing materials (iron ore fines, flue dust), 100% BF return fines, 80% of total requirement of limestone, 80% of total requirement of dolomite, 80% of total requirement of coke breeze are blended in the base blending yard. Blended mix and corrective additions of limestone (20% of total requirement), dolomite (20% of total requirement) and coke breeze (20% of total requirement) are received from the raw material blending yard to the sinter plant proportioning building. Burnt lime will be carried by lime tanker and fed to lime bin by pneumatic lime transportation system. A brief description of major facilities proposed for the sinter plant complex is given below.

Proportioning unit: Suitable capacity of storage and proportioning bins has been envisaged for the sinter plant. The bunkers for blended mix and return fines will have single outlet while bunkers for corrective additions of crushed limestone, crushed dolomite and crushed coke breeze will have twin outlets. All the bins will be suitably lined except return fines bin, which will be self lined. The blended mix, corrective additions and in-plant returns will be fed to the common collecting conveyor by electronic belt weigh feeders, whereas, lime will be fed to common collecting belt conveyor by loss in weigh feeder. Proportioned material from belt weigh feeders

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below respective proportioning bins shall be transported to a combined mixing and nodulizing drum by a common belt conveyor.

Combined mixing and nodulizing unit: Material from belt weigh feeders below respective proportioning bins will be transported to a combined mixing and nodulizing drum by a belt conveyor where the various raw materials will be moistened and mixed in drum mixer. Lime from lime bins will be discharged onto common collecting conveyor through lime dosing equipment. A fixed quantity of water of about 60% of requirement will be added in the mixing part and the rest variable quantity will be added in the nodulizing part depending on requirement. The raw mix discharged from mixing and nodulizing drum will be transported to sinter plant main building by a belt conveyor.

Sinter plant main building: The sinter plant main building will mainly consist of hearth layer and raw mix feeding units, ignition furnace, sinter machine, hot sinter breaker. The sintering machine will comprise charging and discharging sprockets, drive unit, spring loaded pallet cars with high chrome cast steel grate bars, rails, curved guides at charging and discharge ends, grate bar cleaning device, automatic lubrication system, provision for thermal expansion, wind boxes, wind main with dust hoppers and double cone dust valves, machine Spillage hoppers, sinter machine support structures. The hearth layer (15 - 25 mm) will be spread onto the sintering machine first, followed by sinter mix. The height of the sinter mix bed onto the machine will be 650 mm including 50 mm protective hearth layer height. The hearth layer is provided for the following reasons:

- Prevent plugging of the passage between grate bars
- Prevent the scaling and overheating of the grate bars
- Prevent the adhesion of fused sinter to grate bars
- Ensure uniform gas distribution through the sinter mix bed

The ignition furnace with post heat hood and pre-heating (before ignition furnace) will be installed just after the sinter mix drum feeder. The ignition furnace will have suitably located energy efficient type gas firing burner designed for 2000 kcal/Nm³ of mixed gas. Gas mixing station and gas boosting station will be located outside sinter plant battery limit approximately 250 to 350°C hot air for the combustion is supplied from waste heat recovery system of sinter cooler. Multicyclone will be provided at inlet of combustion air fan to supply clean hot air from discharge of cooler.

The hot air for combustion will have control by having intake in cold air. The ignition temperature will be 1200 – 1300oC RC Lot burners will be provided for start up and safety. Hot air from waste heat recovery system of sinter cooler will also be used for preheating of raw material before ignition furnace and post heat hood after ignition furnace. The recovered waste heat from cooler will be utilized for ignition, post ignition and preheating of raw-mix. For suction of air through sinter mix bed on the sintering machine two numbers of exhausters will be provided.

Circular sinter cooler will be used to cool the sinter to less than 100°C after it is discharged from hot sinter breaker at approximately 800°C up to (-) 150 mm size, so that it can be transported through conventional conveyor system. Forced draught fans will be provided to cool the sinter in sinter cooler. Deep bed dip rail circular cooler of adequate capacity will be provided to match the sinter machine production with all the associated facilities like cooler fans, heat recovery system etc. Retention time for the coolers will be of approx. 60 minutes.

Cooling of sinter is achieved by up-drafting ambient air through the bed of hot sinter to be cooled. The sinter after being cooled in the sinter cooler is transported to the screening house. In the screening house, sinter screening will be carried out in single deck screens arranged vertically in series. The screen house in sinter plant is a separate building in which all the vibrating screens will be located. These screens are arranged one above the other in order to facilitate successive screening of the gross sinter.

The process flow of sinter plant is presented below.

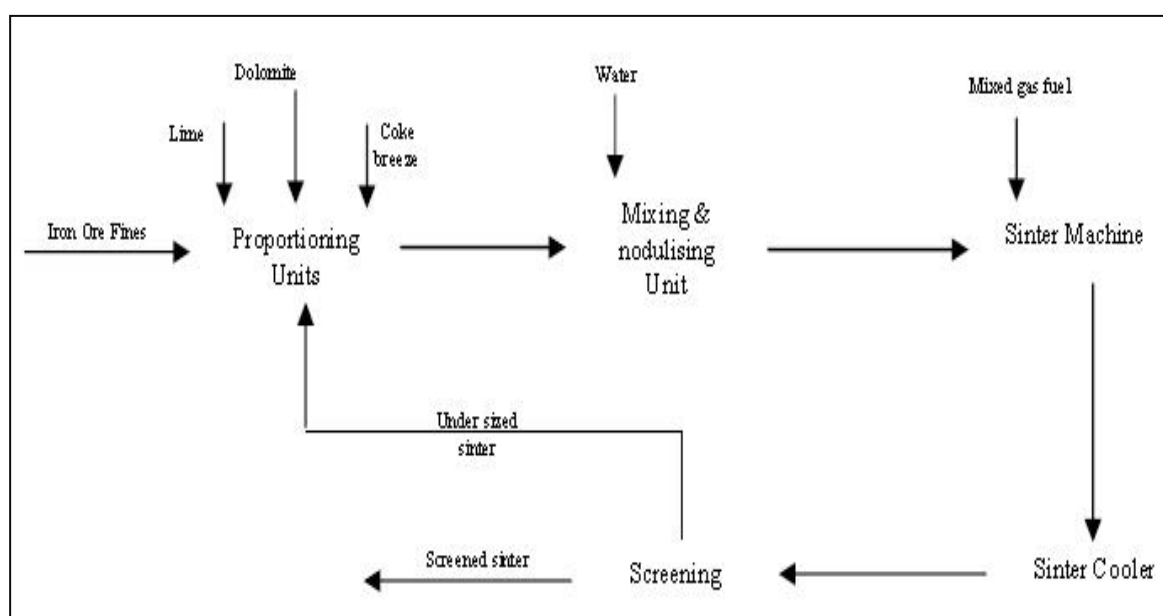


Figure-3.1 : Process flow of Sinter Plant

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2.7.2 MINIBLAST FURNACE

The Company is planning to install one Blast Furnace of capacity 1X500 M3 for production of 5,00,000 TPA Liq. Metal/pig Iron.

A Blast furnace is a type of metallurgical furnace used for smelting to produce industrial metals, generally iron, but also others such as lead or copper. In a blast furnace, fuel, ores, and flux (limestone) are continuously supplied through the top of the furnace, While a hot blast of air (sometimes with oxygen enrichment) is blown into the lower section of the furnace through a series of pipes called tuyeres, so that the chemical reactions take place throughout the furnace as the material moves downward. The end products are usually molten metal and slag phases tapped from the bottom, and Hue gases exiting from the top of the furnace, The downward flow of the ore and flux in contact with an up flow of hot, carbon monoxide-rich combustion gases is a counter current exchange process.

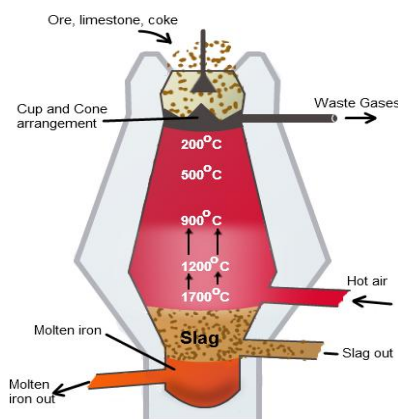
In contrast, air furnaces (such as reverberatory furnaces) are naturally aspirated usually by the connection of hot gases in a chimney flue. According to this broad definition, bloomeries for iron, blowing houses for tin, and smelt mills for lead would be classified as blast furnaces. However, the term has usually been limited to those used for smelting iron ore to produce pig iron, an Intermediate material used in the production of commercial iron and steel, and the shaft furnaces used in. combination with sinter plants in base metals smelting.

Modern furnaces are equipped with an array of supporting facilities to increase efficiency, such as or storage yards where barges are unloaded. The raw materials are transferred to the stock-house complex by ore bridges, or ma hoppers and.ore transfer cars. Rail-mounted scale cars or computer controlled weight hoppers weigh out the various raw materials to yield the desired hot metal and slag chemistry. The raw materials are brought to the top of the blast furnace via a skip.car powered by winches or conveyor belts.

There are different ways in which the raw materials are charged into the blast furnace. Some blast furnaces use a "double bell" system where two

"bells" are used to control the entry of raw material into the blast furnace. The purpose of the two bells is to minimize the loss of hot gases in the blast furnace. First, the raw materials are emptied into the upper or small bell which then opens to empty the charge into the large bell. The small bell then doses, to seal the blast furnace, while the large bell rotates to provide specific distribution of materials before dispensing the charge into the blast furnace. A more recent design is to use a "bell-less" system. These systems use multiple hoppers to contain each raw material, which is then discharged into the blast furnace through valves. These valves are more accurate at controlling how much of each constituent is added, as compared to the skip or conveyor system, thereby increasing the efficiency of the furnace. Some of these bells-less systems also implement a discharge chute in the throat of the furnace (as with the Paul Wurth top) in order to precisely control where the charge is placed.

The iron making blast furnace itself is built in the form of a tall structure, lined with refractory brick, and profiled to allow for expansion of the charged materials as they heat during their descent, and subsequent reduction in site as melting starts to occur. Coke, limestone flux, and iron ore (iron oxide) are charged into the top of the furnace. In a precise filling order which helps control gas flow and the chemical reactions inside the furnace. Four "uptakes" allow the hot, dirty gas high in carbon monoxide content to exit the furnace throat while "bleeder valves" protect the top of the furnace from sudden gas pressure surges.



The coarse particles in the exhaust gas settle in the "dust catcher" and are dumped into a railroad car or truck for disposal, while the gas itself flows through a venturi scrubber and/or electrostatic precipitators and a gas cooler to reduce the temperature of the cleaned gas.

The "casthouse" at the bottom half of the furnace contains the bustle pipe, water cooled copper tuyeres and the equipment for casting the liquid iron and slag. Once a "tap-hole" is drilled through the refractory clay plug, liquid iron and slag flow down a trough through a "skimmer" opening, separating the iron and slag. Modern, larger blast furnaces may have as many as four tap holes and two casthouse. Once the pig iron and slag has been tapped, the tap-hole is again plugged with refractory clay.

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The tuyeres are used to implement a hot blast, which is used to increase the efficiency of the blast furnace. The hot blast is directed into the furnace through water-cooled copper nozzles called tuyeres near the base. The hot blast temperature can be from 900 °C to 1300 °C (1600 °F to 2300 °F) depending on the stove design and condition. The temperatures they deal with may be 2000°C to 2300°C. Oil, tar, natural gas, powdered coal and oxygen can also be injected into the furnace at tuyere level to combine with the coke to release additional energy and increase the percentage of reducing gases present which is necessary to increase productivity.

Power From Blast Furnace:

Waste gases generated from the Blast Furnace which after combustion releases significant heat. This heat contains significant calorific value. This heat will be used to produce steam through Waste Heat Recovery Boilers. The high pressure steam will be used to run turbines and generate 30 MW electricity.

2.7.3 SPONGE IRON PLANT

As per EC dated 04.01.2023, the company was proposed one 400 TPD DRI Kiln for Production of 1,32,000 TPA sponge Iron which is under operation. It is now planning to install (3x650) TPD DRI kilns for production of 6,43,500 TPA sponge iron (@330 working days in a year). Ultimately 7,75,500 TPA Sponge Iron will be produced after proposed expansion project.

Manufacturing Process

The proposed plant shall use the coal-based process in which iron oxide in pellet will be reduced with non coking coal in a rotary kiln to make sponge iron. The raw materials (Pellet / iron ore, coal and dolomite), in desired quantities and sizes, are fed into the rotary kiln from the feed end, after the rotary kiln has been fired and reaches the desired temperature. The rotary kiln is a refractory lined cylindrical vessel on which blowers and air pipes are mounted to provide combustion air to the kiln. The rotary kiln has a downward slope and is mounted on rollers to enable rotation. The angle of inclination, rotational speed, and length of time the charge is exposed to the atmosphere and temperature has important bearings on the quality of the end product. The rotary kiln has three functions as: It is a heat exchanger, Vessel for chemical reaction, Conveyor for solids.

With the rotation of the kiln, the charge moves down the slope and the surface of the material is exposed to heat. The heat exchange takes place

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via the non-refractory lining of the kiln. The reduction from oxide to metal occurs by gradual removal of oxygen at various temperatures giving rise to various intermediate oxides. Hot sponge iron is discharged from the kiln discharge end and taken into the rotary cooler. The effluent gas that contains coal volatile matter, fine carbon particles, iron fines and sponge iron dust is treated separately in the waste gas handling system. The system consists of:

- a) Dust settling chamber
- b) After burner chamber
- c) Waste heat recovery boiler
- d) Electrostatic precipitator
- e) ID fan
- f) Chimney

Direct Reduced Iron / Sponge Iron Process (DRI)

The process of reduction takes place inside the rotary kiln, which is mounted on tyres and supported by support rollers. The transverse motion of the kiln is controlled with the help of hydro thruster and thrust rollers. The kiln is rotated at the rate of 0.35 rpm with the help of a girth gear mounted on the kiln and connected with pinion drives, which in turn are coupled with gear boxes and motors.

The direct reduction of iron oxides inside the kiln is held due to CO gas, which is generated out of coal at nearly 950°C. Shell air fans are mounted on the kiln, which inject air in controlled manner into the kiln for creating reducing atmosphere. The CO reacts with Fe_2O_3 and reduces it to Fe. The kiln is lined with refractory for sustaining the high temperature.

The hot sponge iron is then cooled by indirect cooling inside a cooler. The rotary cooler is supported on tyres and support rollers. The cooler is rotated at the rate of 0.6 rpm with the help of a girth gear mounted on the cooler and connected with single pinion drive, which is coupled with a gearbox and motor. The water is sprayed on the cooler shell while the sponge iron travels inside the cooler and hence, the material gets cooled at outlet to 150°C while discharged on the product conveyor.

In the kiln, the iron oxide will be heated to the reduction temperature of 1000-1050°C. The iron oxide of the ore will be reduced to metallic iron by carbon dioxide generated in the kiln from coal. The heat required for the reduction process will also be supplied by the combustion of coal.

Thermocouple will be installed along the length of the kiln shell for measurement of thermal profile of the kiln. The temperature will be

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controlled by regulating the amount of combustion air admitted into the kiln through no. of ports with help of fans mounted on the kiln will have variable speed drive. Auxiliary drive is provided for slow rotation.

The cooler will be lined with refractory castable for about 4.0 m from the feed end. Bypass arrangement will be provided at discharge end of the cooler for emergency discharge of materials. The cooled product will be conveyed to the product processing building by a system of belt conveyors.

The cooling water will be collected in the trough below the cooler and sent to the cooling tower for cooling. The cooled water will be re-circulated. Closed circuit cooling system will be followed in the plant.

Product Separation

The sponge iron along with unburnt coal in the form of dolochar comes out of the cooler. The sponge iron being magnetic is separated out of the dolochar by passing it through a magnetic separator. The sponge iron and char, recovered separately, are stored in the storage bunkers and discharged through trucks.

Off gas cleaning system

The off gases moving in counter current of material flow inside the kiln are at a temperature of 1000°C and carry coal dust, which is passed through dust settling chamber and after burning chamber (ABC). Air is added into the ABC for converting CO to CO₂. The hot flue gas stream is taken to the waste heat recovery boiler (WHRB) for utilization of the sensible heat for making steam. The off gases are then allowed to pass through ESP for removal of dust so that the concentration of dust is limited to below 30 mg/Nm³ before being discharged from the chimney.

In-plant de-dusting system

Reverse air bag filter shall be installed for catching the dust from various conveyors, material handling equipment and-product handling equipment. The dust collected from the bag filter shall be conveyed pneumatically to a distant location and discharged on trucks in wet condition.

Raw Materials required for Sponge Iron manufacture

The main raw materials for sponge iron production are pellet / iron ore, coal, and dolomite.

Preferred Raw Material Characteristics

The principal burden material will be used for production of steel making grade DRI in the sponge making process is pellet / iron ore, non-coking coal and dolomite.

The pellet/iron ore should be preferably high in Fe content (>62% Fe). Coal with a high reactivity and high fusion temperature is preferred. The coal should also be non-coking.

A low ash fusion temperature is undesirable as it promotes formation of accretions in the kiln. The coal ash composition is also important as a siliceous ash might react with ferrous oxide to form low melting ferrous silicate and interfere with the reduction to metallic iron.

Product characteristics of Sponge Iron are presented in Table-3.1.

Table-3.1 : Sponge Iron (coal based) characteristics

Fe (total)	92% min
Fe (met)	83 % max
Metallization	90 % max
Carbon	0.25 % max
S	0.025% max
P	0.06% max
Re-oxidation	Non-pyrophoric characteristics

Major plant facilities

The major plant facilities for the sponge iron plant envisaged are as follows:

1. Day bins
2. Rotary kiln and cooler
3. Off gas system including waste heat power generation
4. Product processing and storage.

Day bins

There shall be a day bin building to cater to raw material requirement of the kiln. These bins will generally have storage of about one day's requirement of pellet, feed coal (4-8, 8-18 mm) & dolomite (1-4 mm). Weigh

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feeders will be provided to draw the required quantity of various materials in proportion from the bins and the same will be conveyed to the kiln feed and discharge end.

Rotary kiln and cooler

The rotary kilns with 4.350 m of diameter, 76 m length will be provided for reduction of iron oxides into sponge iron using non-coking coal as reductant. The kiln will be lined with abrasion resistant refractory castables throughout its length with dampers at feed end and discharge end.

The rotary kiln will be supported on four piers. A slope of about 2.7% shall be maintained. Then main drive of the kiln will be by A.C motors with VVF drive control. The speed of the kiln will be in the range of 0.3-0.9 & 1.05-3.15 rpm. The auxiliary drive of the kiln will be by A.C motors.

The other main components of the kiln will be as given below:

- a. Feed end and discharge end transition housing of welded steel construction with refractory lining including feed chute.
- b. Pneumatic cylinder actuated labyrinth air seal complete with auto lubricating at feed end and discharge end.
- c. On board equipment like fans, manifolds, ports, slip ring, instrumentation etc.
- d. Cooling fans at feed end and discharge end.
- e. Feed end double pendulum valve & dust valves.

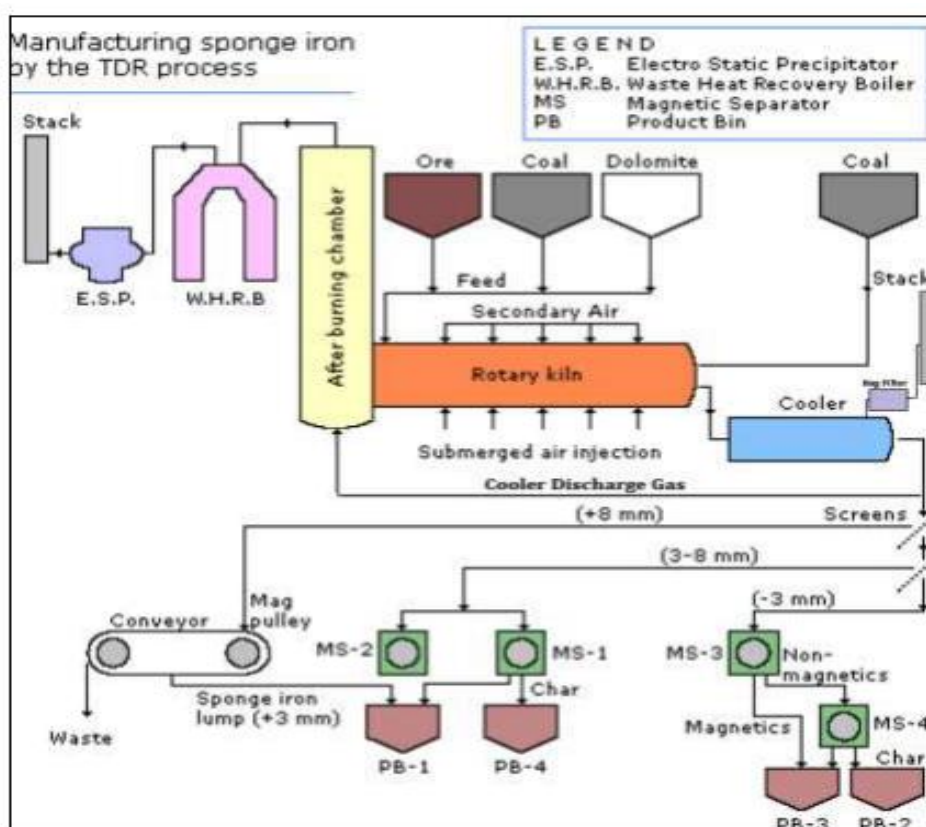
Product processing and storage

There shall be one product processing unit for handling the cooler discharge. The product containing sponge iron, char and spent lime from the cooler discharge end will be discharged to a set of conveyors and sent to the product processing building. The kiln cooler system shall have a separate surge bin. Product from surge bin can be withdrawn through vibrating feeder and to the product will first be screened in a double deck screen having 3 mm and 20 mm screens. +20 materials shall be dumped as rejects. The screened product i.e. +3 – 20 mm and -3 mm fraction shall separately be sent to the product storage separation. Sponge iron lump (3 – 20) shall be sent to the product storage building for storing in two no. of bunkers where three days storage has been proposed. The sponge iron fines

(-3 mm) will be stored in the fines bunker in the product processing building itself where one day storage will be provided. The sponge iron lump and fines will be further conveyed from the respective bunkers by truck to the steel making unit as per the requirement. The char/non-magnetic shall be stored in a separate bin from where it will be sent to the power plant through conveyors for its utilization for power generation in FBC boiler.

Indicative process flow diagram of DRI Plant is presented below in Figure-3.2.

Figure-3.2: Process flow diagram of DRI plant



2.7.4 STEEL MELTING SHOP

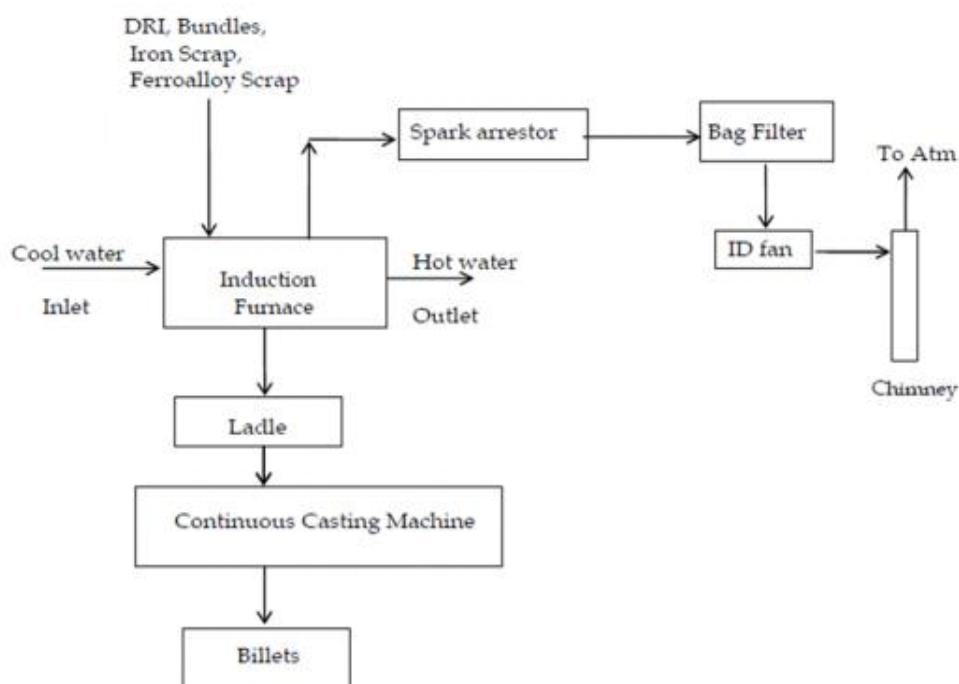
Induction Furnace

The company's current activity involves operation of (1x3 T + 1x6 T + 2x15 T) Induction Furnaces for production of 1,22,467 TPA Billets. As per EC 2023, remaining 2x15 T Induction Furnaces will be implemented. Now, the company has proposed to install (6X25 Ton) Induction Furnaces for production of 6,17,400 TPA Billets. The company is also planned for enhancement (through optimization in operation) the production capacity of 4x15 T + 2X10 T (as per EC 2010 & 2023) from 2,55,500 TPA to

3,29,280 TPA Billets (considering 12 heats per day & 350 working days). Ultimately, the overall production capacity after proposed expansion project will be 9,46,680 TPA Billets. The existing 1x3 T+1x6 T Induction Furnaces will be replaced by 2x10 T Induction Furnaces.

The plant will produce steel in the form of billets, Structural Steels (Angles, Channels, Joist, TMT Bars, Wire Rod, Strips & Pipes etc.) through IF-CCM-RM route. Steel making will be done using induction furnaces. A brief description of the processes is dealt in subsequent paragraphs and the process flow sheet is given below in Figure-3.3.

Figure-3.3 : Process flow diagram of SMS unit with CCM



Steel Making by Induction Furnace

The greatest advantage of the Induction Furnace is its low capital cost compared with other types of Melting Units. Its installation is relatively easier and its operation simpler. Among other advantages, there is very little heat loss from the furnace as the bath is constantly covered and there is practically no loss during its operation. The molten metal in an Induction Furnace is circulated automatically by electromagnetic action so that when alloy additions are made, a homogeneous product is ensured in minimum time. The time between tap and charge, the charging time, power delays etc. are items of utmost importance is meeting the objective of maximum output in tones/hours at a low operational cost. The

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disadvantage of the induction furnace is that the melting process requires usually selected scrap because major refining is not possible.

The process for manufacturing steel may be broadly divided into the following stages:

- i. Melting the charge mixed of steel & Iron scrap
- ii. Ladle teeming practice for Casting (OR)
- iii. Direct teeming practice for billet Casting unladdable teeming machine

The furnace is switched on, current starts flowing at a high rate and a comparatively low voltage through the induction coils of the furnace, producing an induced magnetic field inside the central space of the coils where the crucible is located. The induced magnetic fluxes thus generated out through the packed charge in the crucible, which is placed centrally inside the induction coil.

As the magnetic fluxes generated out through the scraps and complete the circuit, they generate and induce eddy current in the scrap. This induced eddy current, as it flows through the highly resistive bath of scrap, generates tremendous heat and melting starts. It is thus apparent that the melting rate depends primarily on two things (1) the density of magnetic fluxes and (2) compactness of the charge. The charge mixed arrangement has already been described. The magnetic fluxes can be controlled by varying input of power to the furnace, especially the current and frequency.

In a medium frequency furnace, the frequency range normally varies between 150-10K cycles / second. This heat is developed mainly in the outer rim of the metal in the charge but is carried quickly to the center by conduction. Soon a pool of molten metal forms in the bottom causing the charging to sink. At this point any remaining charge mixed is added gradually. The eddy current, which is generated in the charge, has other uses. It imparts a molten effect on the liquid steel, which is thereby stirred and mixed and heated more homogeneously. This stirring effect is inversely proportional to the frequency of the furnace and so that furnace frequency is selected in accordance with the purpose for which the furnace will be utilized.

The melting continues till all the charge is melted and the bath develops a convex surface. However, as the convex surface is not favorable to slag treatment, the power input is then naturally decreased to flatten the convexity and to reduce the circulation rate when refining under a reducing slag. The reduced flow of the liquid metal accelerates the purification reactions by constantly bringing new metal into close contact with the slag. Before the actual reduction of steel is done, the liquid steel which might contain some trapped oxygen is first treated with some suitable deoxidizer. When no purification is attempted, the chief metallurgical advantages of the process attributable to the stirring action are uniformity of the product, control over the super heat temperature and the opportunity afforded by the conditions of the melt to control de-oxidation through proper addition.

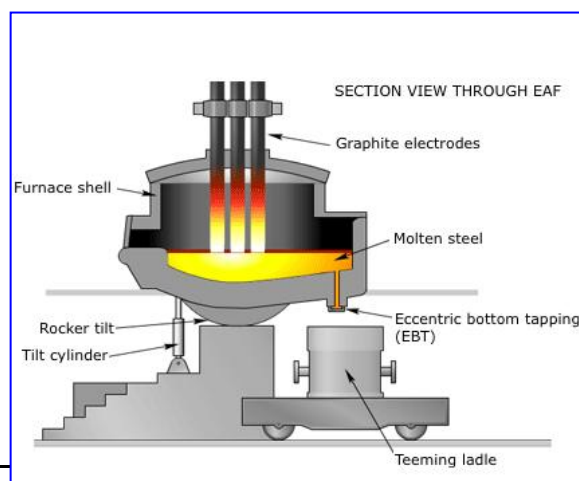
As soon as the charge has melted clear and de-oxidising ions have ceased, any objectionable slag is skimmed off, and the necessary alloying elements are added. When these additives have melted and diffused through the bath of the power input may be increased to bring the temperature of metal up to the point most desirable for pouring. The current is then turned off and the furnace is tilted for pouring into a ladle. As soon as pouring has ceased, any slag adhering to the wall of the crucible is scrapped out and the furnace is readied for charging again.

As the furnace is equipped with a higher cover over the crucible very little oxidation occurs during melting. Such a cover also serves to prevent cooling by radiation from the surface heat loss and protecting the metal is unnecessary, though slags are used in special cases. Another advantage of the induction furnace is that there is hardly any melting loss compared with the arc furnace.

A metal Recovery Plant is proposed to recover the metals from the stag, to be generated.

Electric Arc Furnace

The company has decided to install 1x25 T Electric Arc Furnaces to produce 1,94,000 TPA billets. In Electric Arc Furnaces, the electric energy is used to form an electric arc which heats the metal by radiant heat evolved.



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This can be further sub-divided as:

Direct Arc Furnace: Electric arcs are formed between the electrodes and metal being heated, which is thus a component of the electric circuit and is heated by the radiation from the arcs. Direct arc furnaces are used to produce high carbon steels and low alloyed steels.

Submerged Arc Furnace: The arcs burn under a cover of solid charge which surrounds the electrodes. These are mostly used for ore smelting operations, in particular for making Ferro-alloys. In these furnaces, carbon electrodes are used to create the electric arc.

In India, most of the electric arc furnaces are using Direct Arc Furnaces.

An EAF is a furnace that heats charged material by means of an electric arc. They range in size from small units of approximately one tonne capacity (used in foundries for producing may have a capacity of only a few dozen grams. EAF temperatures can be up to 1,800°C. The processes are used in these units is divided into following major steps:

- Preparation and charging of raw material
- Melting and refining of the melt
- Casting of molten metals into ingots, blooms and billets

The furnace has a steel shell in the form of a tapered cylinder with a spherical bottom. The shell has a refractory lining inside. The reaction chamber of the furnace is covered from above by a removable roof made of refractory bricks held by a roof ring. The furnace has a main charging door and a tap hole with tapping spout. It is fed with a three phase alternating current and has three electrodes fastened in electrode clamps which are connected by means of a sleeve with a movable electrode stand. Current is supplied via water cooled flexible cables and water cooled copper tubes. The furnace rests upon two support sectors which can roll on the furnace stand to tilt the furnace towards the main door and towards the tap hole for tapping, the tilting motion being affected by a rack mechanism.

The furnace is charged from the top by means of a pan. To open the reaction chamber for charging, the furnace roof which is suspended from chains is raised up to the gantry. The latter together with the roof and electrodes, can be swung towards the tapping spout. A rotating mechanism is provided to rotate the furnace shell through an angle of 40 degrees in both directions from the normal position. The furnace also has an electromagnetic stirring device for intermixing of molten metal.

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Although electricity provides most of the energy for EAF steel making, supplemental heating from oxy-fuel and oxygen injection is used. The major advantage of EAF steel making is that it does not require molten iron supply. By eliminating the need for blast furnaces and associated plant processes like coke oven batteries, EAF technology has facilitated the proliferation of mini-mills, which can operate economically at a smaller scale than larger integrated steel making. EAF steel making can use a wide range of scrap types, as well as DRI and molten iron (up to 70%). This recycling saves virgin raw materials and the energy required for converting them. The EAF operates as a batch melting process, producing heats of molten steel with tap-to- tap times for modern furnaces of less than 60 minutes.

Arc furnace process

Oxygen Lancing

Steel in arc furnace may be refined with or without oxidation. Oxidation may be dispensed where the metal ingredients of the charge are close to the desired steel grade in analysis. In such case, a reducing slag is used both in melting and refining (single refining or single slag practice). Usually, this process is used to smelt alloy wastes to alloy steel. In working with oxidation, the charge is melted and refined under an oxidizing slag or 'black slag' (the slag is called 'black' due to the colour it is given by the iron oxide), removing phosphorous and/or carbon almost completely; then the 'black slag' is removed and a reducing or 'white slag' containing lime, fluorspar, silica, carbon and/or ferrosilicon made up, giving a very high degree of desulphurization and good de-oxidation. Additions of the required ferroalloys are made during this stage, or sometimes to the ladle.

The principal processes in the oxidizing period are

- i) Removal of phosphorous
- ii) Oxidation of silicon and manganese
- iii) Removal of sulphur
- iv) Removal of nitrogen and hydrogen
- v) Removal of non-metallic inclusions
- vi) Heating of the metal
- vii) Reboil and
- viii) Carbonization of metal

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A modern development in arc furnace practice is the use of an oxygen lance for injecting high pressure oxygen into the bath, during the oxidation period. This removes carbon more rapidly than by ore alone. Lancing does not need an arc for heating. The use of oxygen lance has special advantage in the manufacture of stainless steel. If oxygen is blown into the metal, exothermic reactions prevail in the bath, the metal is heated up quickly, and it is possible to switch off the current as soon as the carbon begins to burn intensively.

The aims of the reducing period during the melt in a basic EAF are:

- i) De-oxidation of the metal
- ii) Removal of sulphur,
- iii) Adjustment of the steel composition to specifications,
- iv) Control of the bath temperature, and
- v) Preparation of well oxidized free running highly basic slag, which can be used for off-furnace treatment of the metal in the ladle.

The reducing period can be shortened considerably if the metal is treated with argon or synthetic slag or deoxidized in the ladle.

Deslagging

After the charge is completely melted, the foam slag is taken out from the charging door. The furnace is tilted to an angle upto 15 degrees and the molten slag is taken out.

Tapping

There are two main methods of tapping the molten metal from the surface.

- Side tapping
- Eccentric Bottom Tapping

Side tilting mechanism are employed with smaller capacity furnaces and is mounted on a column at the furnace side.

In the eccentric bottom type tapping, the furnace rests on 2 to 4 supports sectors which are on a horizontal stand. This system is very effective because of high yield. In this system, liquid steel with minimum slag carry over goes into the ladle.

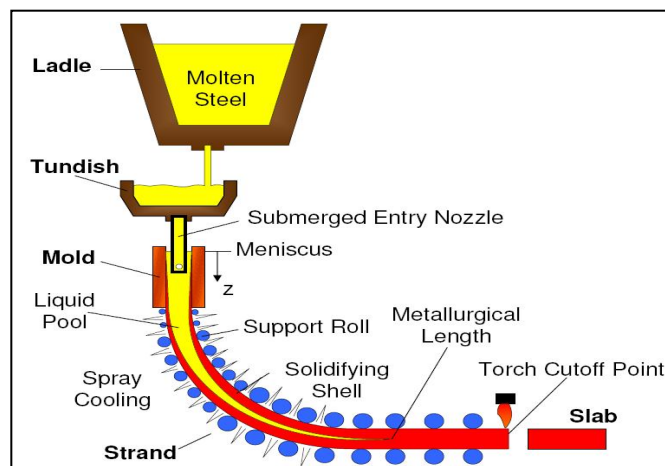
Continuous Casting Machine

The molten steel from the IF & EAC is cast in a continuous casting machine to produce billets. In some processes, the cast shape is torch cut

to length and transported hot to the hot rolling mill for further processing. Other steel mills have reheat furnaces. Steel billets are allowed to cool, and then be reheated in a furnace prior to rolling the billets into bars or other shapes.

The process is continuous because liquid steel is continuously poured into a 'bottomless' mould at the same rate as a continuous steel casting is extracted.

- Before casting begins a dummy bar is used to close the bottom of the mould.
- A ladle of molten steel is lifted above the casting machine and a hole in the bottom of the ladle is opened, allowing the liquid steel to pour into the mould to form the required shape.
- As the steel's outer surface solidifies in the mould, the dummy bar is slowly withdrawn through the machine, pulling the steel with it.
- Water sprays along the machine to cool/ solidify the steel.
- At the end of the machine, the steel is cut to the required length by on line PLC based hot shearing machine.
- After cut, hot billets will directly go to rolling mill through conveyer.



CONTINUOUS CASTING PROCESS

2.7.5 FERRO ALLOY PLANT

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The Company has proposed to install 3x12 MVA Submerged Arc Furnaces for production of 65,600 TPA Si-Mn or 88,800 TPA Fe-Mn or 30,400 TPA Fe-Si or 67,200 Low Carbon Fe-Cr. Process technology selection and manufacturing route are very crucial for achieving efficiency and economy. This project envisages setting up of a Ferro Alloy plant wherein suitable and sized material will be produced.

This plant shall be designed for production of Ferro Alloys (Ferro Chrome, Silico Manganese, Ferro Silicon & Ferro Manganese). The standard grade of Ferro Chrome has Cr content of ~60% and Silico Manganese has Mn content of ~60% and Si content of 14-15%.

Process

The production of Ferro alloys is a continuous slagging process. The oxides of chromium, manganese, iron, silicon, phosphorous etc. contained in the ore is reduced by the carbon present in coke/coal in a submerged electric arc furnace. The reduction of oxide is accompanied by evolution of gases at furnace top.

Silico Manganese/Ferro Chrome

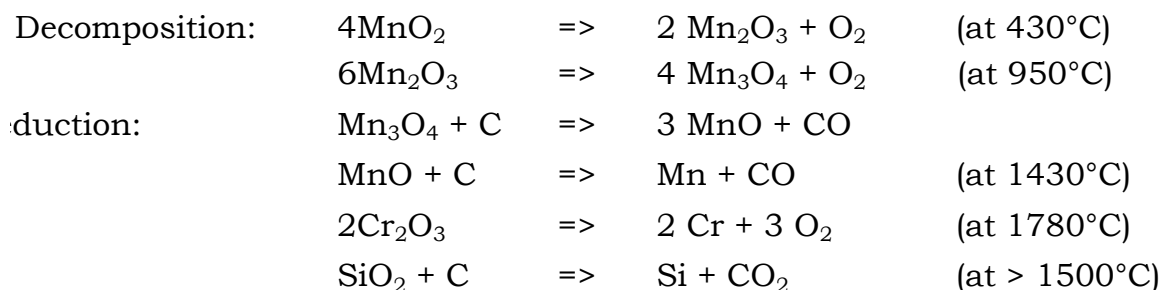
Silico Manganese is an alloy of manganese with silicon & iron. Ferro Chrome is an alloy of chromium with iron & silicon with silicon present in smaller quantities. Ferro alloys are widely used in metallurgy as a complex reducer and alloying additive in making various grades of steel, with ferro chrome usage limited largely to stainless steel production, but in significantly higher quantities.

The concept of the use of Silico manganese instead of ferro manganese and ferro silicon pure into the steel is due to its cost effectiveness, as ferro manganese and ferro silicon require purer raw materials, which are costlier. Moreover, silico manganese goes for production of refined grades of Ferro manganese i.e. low and medium carbon ferro manganese. Ferro manganese, on the other hand is used where Si content in the finished steel has to be controlled accurately as is the case in steel flat products (sheets and plates).

Silicides of Manganese are more stable compounds than carbides. Therefore, the higher the Si content in manganese alloys, lower is the carbon content.

Ferro alloys are produced by reduction of ores by the carbon contained in coke and coal.

The chemical reactions taking place are as follows:-



The Cr, Mn and Si thus formed join the alloy.

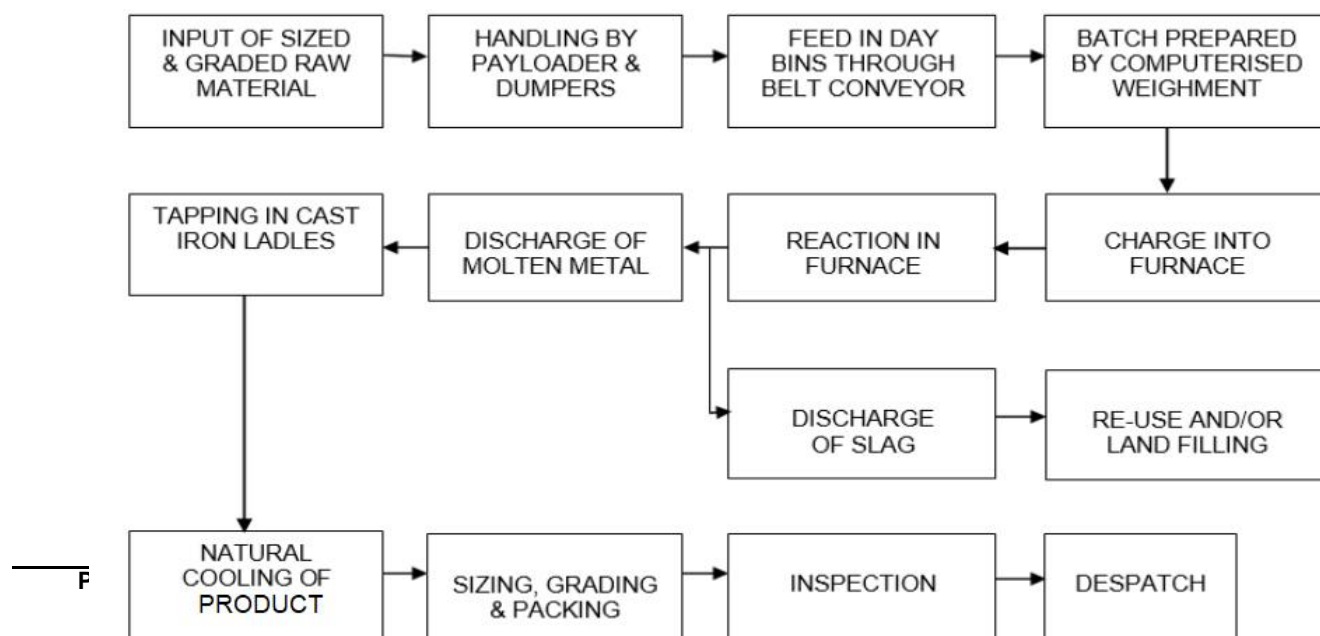
The excess SiO_2 , Al_2O_3 , oxides of calcium and Magnesium get generated during the process and join the slag. 0.8 – 1.2 Tonne of slag produced per tonne of alloy. This would be used for land filling purposes. Fluxes may be added to control the slag fluidity.

Metal (Alloy) and slag are tapped simultaneously 3 - 4 times per shift.

Selection of Plant Capacity

Ferro Chrome, Silico Manganese, Ferro Silicon and Ferro Manganese are typically smelted in 5000 - 18000 KVA closed top submerged electric arc furnaces with transformer secondary voltage 100 – 200 V. The plant will have 2 submerged arc furnaces of 12 MVA working for 330 days in a year and 3 shifts per day.

PROCESS FLOW CHART OF FERRO ALLOY PLANT



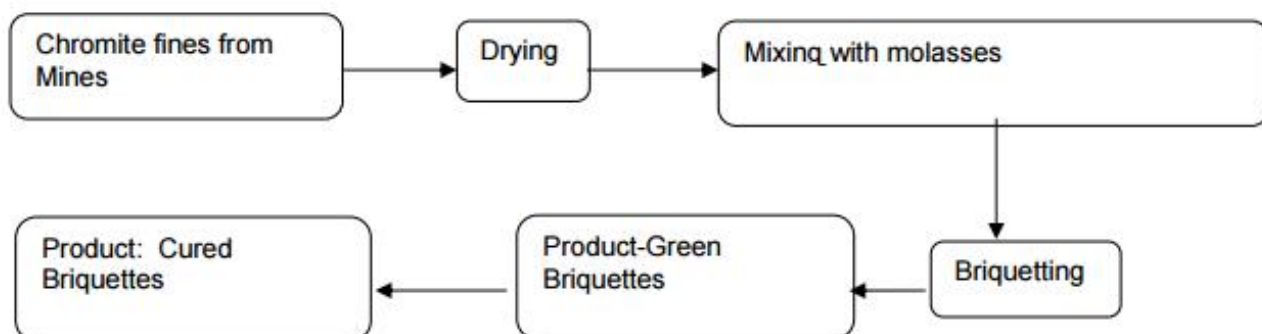
BRIQUETTE PLANT FOR CHROME ORE

The Company has planned to install a Briquette Plant of capacity 20 TPH for production of Chrome Ore Briquette from Chrome fines which will be used in Ferro Chrome production.

Briquetting is a process of agglomeration of ore fines into useful material for feeding into the metallurgical furnaces. The process is applicable for chrome ores & some manganese ores, among others.

If fines are fed directly, a substantial part of it remains unreacted and passes into the slag phase and a significant fraction is also carried by the furnace waste gases to be subsequently recovered in the pollution control equipment. It also reduces the porosity of the charge, thereby obstructing the smooth passage of furnace waste gases and frequently leads to the choking of the furnace.

Chromites ore Fines and concentrates cannot be charged directly into the smelting furnace, especially closed top submerged arc furnace for reason of safety and bad performances. The fines are therefore agglomerated for improving the smelting condition. Various processes are available for agglomeration- sinter pellet, briquettes and chrome ore sinter, the first two process being most widely used. As explained in Figure below, the chrome ore fines received from mines are first dried in dryer. The dry ore is mixed with molasses, and the green mix is then fed to the briquetting presses. The presses compact the mixture at high pressure to form green briquettes. The green briquettes are stored in the storage yard for curing. After curing at ambient temperature for 24 - 48 hrs, the briquettes become stronger and are fed into Submerged Arc Furnaces.



PROCESS FLOW CHART OF BRIQUETTE PLANT

Briquetting is an environmental friendly process as it:

- Reduces emission of metallurgical furnaces
- Reduces requirement of lumpy ores which when processed at the mine site also causes some amount of air and water pollution
- Is a zero discharge and zero emission process

Raw materials input with Mass Balance per 1000 Kgs of Briquette will be given below:

Mass balance per 1000 Kgs of Briquettes

INPUT		OUTPUT	
Chrome ore fines	1000 kg	Briquettes	1000 kg
Lime	25 kg	Water vapour	100 kg
Molasses	60 kg		
Water	15 kg		
TOTAL	1100 kg	TOTAL	1100 kg

Chrome Recovery – Process Description:

Ferro Chrome Slag of size fraction (+0 - 300 mm) will be received on Feed Hopper, which will be discharged from the bottom opening through a Rod Gate and Reciprocating Feeder.

Reciprocating Feeder will discharge the Slag to the Primary Jaw Crusher through Feed Conveyor to feed it to the Primary Jaw Crusher.

Jaw crusher shall crush the slag to (-) 65 mm and discharge the crushed material to Double Deck Sizing Screen Feed Conveyor to feed it to Double Deck Sizing Screen.

+25 mm material from the Surge Hopper will be fed through Rod Gate and Vibrating Feeder to the Secondary Jaw Crusher.

Secondary Jaw Crusher will crush the slag down to -25mm.

The crushed (-) 25mm product will also be discharged to the Double Deck Sizing Screen via Double Deck Sizing Screen Feed Conveyor .

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The overflow (+8 to 25 mm) from the Bottom Deck of Double Deck Sizing Screen will be discharged to Surge Hopper for Coarse and the underflow (+0 to 8 mm) from the Double Deck Sizing Screen shall be discharged to Surge Hopper for Fines.

Jig will produce 3 (Three) types of Products.

- i) Concentrate (Pure Metal)
- ii) Middlings (Remelt)
- iii) Tailings (Slag)

- ✓ Middling will be discharged on to the Middling Conveyor for onward ground storage.
- ✓ Tailings will be discharged on to the Tailings Conveyor for onward ground disposal.

Provision will be kept to further crush the Middling in the Secondary Jaw Crusher.

Clarified water from the tailing settling pond will be recycled back to Jig water feed sump

2.7.6 ROLLING MILL

The company has already installed one Rolling Mill of 24,000 TPA capacity to produce Structural Steels (Strips & Pipes etc.). Rolling Mill of 1,68,000 TPA capacity for production of Structural Steels (Angles, Channels, Joist, TMT Bars, Wire Rod, Strips & Pipes etc.) with 1x15 TPH Reheating Furnace will be implemented. Now, It has planned to install 1x0.30 MTPA capacity Rolling Mill with 1x25 TPH Reheating Furnaces (optional) for production of TMT Bars, Wire Rods & Structural. After proposed expansion project the ultimate capacity of Rolling Mill will be 4,92,000 TPA.

Process

Hot billet from the CCM will be directly transferred through conveyer in the rolling mill through roughing mill, intermediate mills and finishing mills to produce the finished rolled steel. The rolled steel will be cropped & caught in required commercial length by hot saws. The rolls will be finally cooled & taken to storage yard for sale.

Steel Pieces are rolled through all stands in order to get required shape of finished goods i.e. TMT Bars, Rods, Structural etc..

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As a stand by arrangement, Cold Billets will be transferred to roller table and pushed through the oil fired 1x15 TPH Reheating furnace (stand by) by means of charging pusher & then these will be heated and soaked up to 1150°C that is above re-crystallization temperature and then discharged for rolling.

2.7.7 LIME PLANT

The Company is proposed to install a lime Calcination plant of 250 TPD capacity, will comprise of lime shaft kiln to meet the requirement of soft lime for steel making process as well as for other unit.

Calcination or calcining is a thermal treatment process to bring about a thermal decomposition. The process takes place below the melting point of the product. Limestone is one of the most basic raw materials employed in the steel industry and is used both in iron making, steel making, and auxiliary processes. Most of the lime used in the iron and steel industry is for fluxing impurities in the steel making furnace and in many of the secondary steel making processes. Lime is also used in different quantities in the sintering process, in the desulphurization of pig iron, for acid neutralization, and in water treatment facilities.

Limestone of size 25-55 mm will be charged into shaft kiln for calcination. The undersize limestone 0-25 mm in the charge shall be separated out before feeding to the kiln. Limestone will be subjected for calcination at a temp. 1050 -1150°C to achieve soft burnt reactive lime for steel making.

Plant facilities

- Raw material storage bunker building
- Screening and feed bunker building
- Kiln for calcining lime stone
- Lime delivery bin Building
- Dedusting system
- Waste gas cleaning system
- Weigh hopper
- Blower house
- Booster house and gas mixing station
- Hydraulic room
- MCC and control room for kiln & transformer room
- Air conditioning and ventilation system
- Passenger-cum-freight lift

The Process

Limestone of size 25-55 mm will be received from mines and stored in raw material storage yard. From there these materials will be conveyed to raw material storage bunker. The limestone from storage bunkers will be fed to a screen by belt conveyor and undersize limestone of size 0-25 mm will be screened out and stored in another bunker which is meant to store the undersize material. The undersize limestone will be stored for onward disposal to outside agencies. Screened materials of size 25-55 mm will be fed to shaft kilns. The sequence for feeding limestone from raw material storage bunker to screen and from screen to weigh hopper is same of all the. Limestone will be calcined at temperature of 1050°C - 1150°C.

The lime from the kiln will be discharged to conveyors, which are placed below the kilns. The lime will then be screened to separate out different size fractions and store them in separate bunkers. Lime of size 10-55 mm will be conveyed through belt conveyor. Under size lime of size 0-10 mm will then be transported to other consumers.

The waste gas, which is coming out from the kiln having 5-10 gm/Nm³ dust will be cleaned in waste gas cleaning system to vent out the clean gas to atmosphere.

Dedusting systems will be provided for raw material storage building, screen house building and lime delivery bin building to keep dust free atmosphere in the lime kiln area.

2.7.8 OXYGEN PLANT

The Company has proposed to install 225 TPD capacity oxygen plant. Oxygen plant are industrial system designed to generate oxygen. They typically use air as a feed stock and separate it from other components of air using pressure swing adsorption or membrane separation techniques. Such plants are distinct from cryogenic separation plants which separate and capture all the components of air.

It was the efficient use of oxygen in the steel industry which triggered the development of air separation. Even now the steel industry is the main consumer of oxygen and it is oxygen which has made it possible to develop a crucial line in steel melting known as the converter melting processes.

Various technology uses for capturing oxygen in Oxygen Plant are:

a) Adsorption Technology

Gas separation by adsorption systems is based on the fixation of various gas mixture components by a solid substance called adsorbent. Physically, this phenomenon is brought about by the forces of gas and adsorbent molecules interaction.

The adsorption oxygen plants produce oxygen with a purity of 93-95%. These systems, designated for indoor operation, are set to effectively produce gaseous oxygen from atmospheric air.

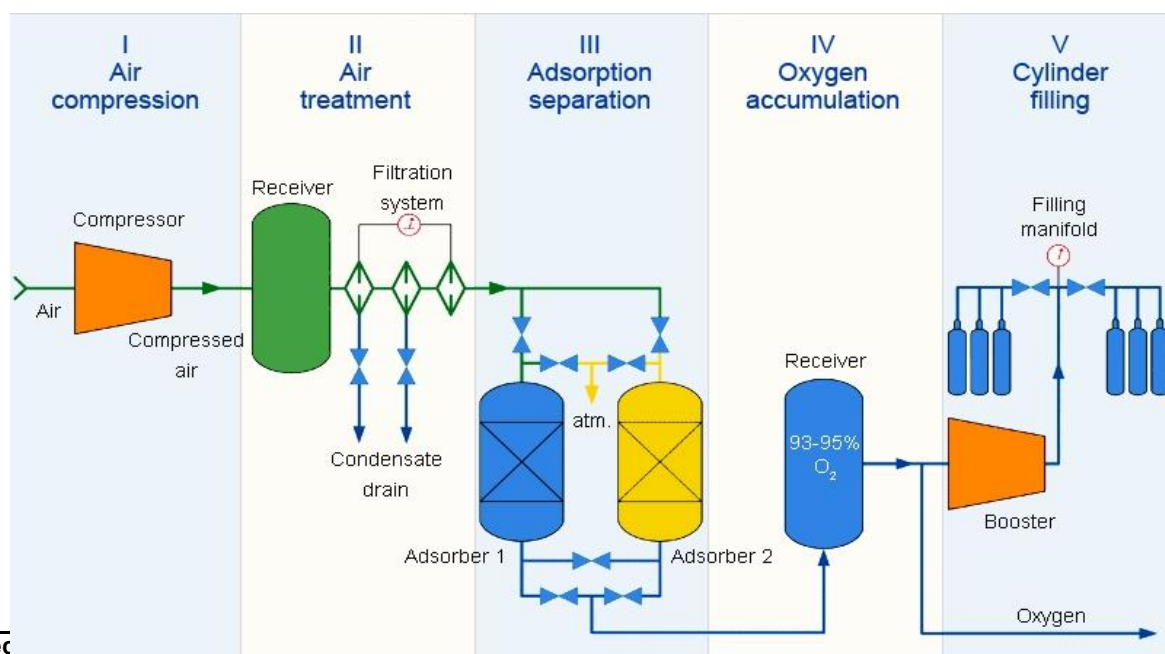
b) Membrane Technology

The Otis of gas media separation with the use of membrane systems is the .difference in velocity with which various gas mixture components permeate membrane Substance. The driving force behind the gas separation process is the difference in partial pressures on different membrane sides.

Designed for indoor operation, membrane oxygen plants allow efficient air enrichment with oxygen up to the concentration of 30-45%. The complexes are rated to 5 to 5,000 nm³/hr of oxygenated air.

Oxygen is used in

- Cast iron and steel production (to remove excessive carbon)
- Converter steel production
- Electric furnace steel production
- Blast furnaces (with oxygen injection)
- Melting of nickel, zinc, lead, zirconium, and other non-ferrous metals
- Intensification of raw material burning in non-ferrous metallurgy
- Direct reduction of iron



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2.7.9 DUCTILE IRON PIPE (DIP) PLANT

The company has planned for installation of 1x0.5 MTPA Ductile Iron Pipe (DIP) Plant for production of 5,00,000 TPA Ductile Iron Pipe.

The Manufacturing Process consists of the following processes steps,

1. Molten Hot Metal preparation and Chemistry correction
2. Magnesium treatment
3. Centrifugal Casting
4. Core Making
5. Mold Maintenance
6. Heat Treatment by Annealing Furnace
7. Zinc Coating
8. Hydraulic Pressure Testing
9. Cement Mortar Lining
10. Bitumen Coating
11. Finishing

A ductile iron pipe is produced with centrifugal casting method. The molten ductile iron is poured into a rapidly spinning water-cooled mould and centrifugal force results in an even spread of iron around the circumference.

Molten Hot Metal Preparation: In Blast Furnace Hot Metal, Carbon percentage (%) is usually 4.2% to 4.3%. But in DIP, Carbon percentage is 3.6%. Therefore Steel Scrap with 0.3% Carbon is to be added by about 12% to 15% of BF Hot Metal.

Magnesium Treatment: During this process, molten Hot metal treated with Ferro Alloys, like Silico-Manganese, Magnesium, carbon etc. and melted with 1460-1520°C of temperature. The George Fischer Converter process has been carried out in the crucibles at about 1500°C by tundish treatment and it was performed by means of 21% of Fe-Si-Mg. Next, molten iron will be poured to the cast process.

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Centrifugal Casting: Centrifugal casting requires water cooling metallic and centrifugal casting machine that works automatically. Types of the machine are divided as the pipe dimension (DN). Here For example, there are machine for DN80-300mm, machine for DN350-700mm or machine for DN700-1000mm.

During the process, the treated liquid iron is poured into spinning mould through a runner. The hot metal starts solidification in the water cooled mould and is extracted as complete pipe. When the molten iron enters the mould spinning, it needs water high speed spin through the long through for the water cooling system. During this process, the solidification process will be started. Finally, the extractor will extract the pipe after it solidified completely.

Core Making: Core making equipment consists of manual machine and automatic machine known as core-making jets. Silicon sand, solidifying agent and resin will be mixed and rolled. Then it's moved to the hopper of the core-making jets machine with a conveyor. Core making process will be started by jetting that material into core box. When it's solidified completely core will be made and tested. Next, core will be conveyed to casting process.

Mould Maintenance: To remove the rust in the internal surface of a mould, it will be grounded with sand wheel before it's dotted with penning head to increase its crack resistance. If cracks found on the mould surface, it will be removed by turning the mould and welding the turning area. Next grinding and penning will accomplish the maintenance.

Annealing / Heat Treatment: The process consists of heating section, heat holding section, slow cooling section and fast cooling section. Ductile iron pipe will be entered to this 52 meters long machine and rolled on it. Certainly its temperature will be controlled.

Zinc Coating: Arc melted Zinc / Zinc-alloy is sprayed on the outer surface of pipe.

EN 545/598 mandates a minimum zinc content of 130 g/m² (with local minima of 110 g/m² at 99.99% purity), and a minimum average finishing layer thickness of 20 µm .

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Finishing and Hydrostatic Testing: Pipe dimension will be checked here and it's important to remove the fins on the internal surface. A Hydrostatic pressure testing will be done in 10 seconds with proper pressure as per the following chart,

Hydraulic pressure for hydrostatic testing

Nominal Diameter (mm) Hydraulic Pressure (Mpa):

80=50mpa=300, 200=50mpa =600, 700=50mpa =1000, 1100=50mpa =2000

Cement Lining: Pipe will be rolled with low speed and it will be sprayed with material. This material includes cement, sand, and water. Pipe will be rolled with high speed to move excessive water and deposit cement. Nature cure will be given to cement lining. Grinder will smooth its surface

Bitumen Coating: As zinc coating, bitumen will be sprayed to pipe. But it will be done to internal and external surface. Bitumen will reduce the corrosion on the external surface.

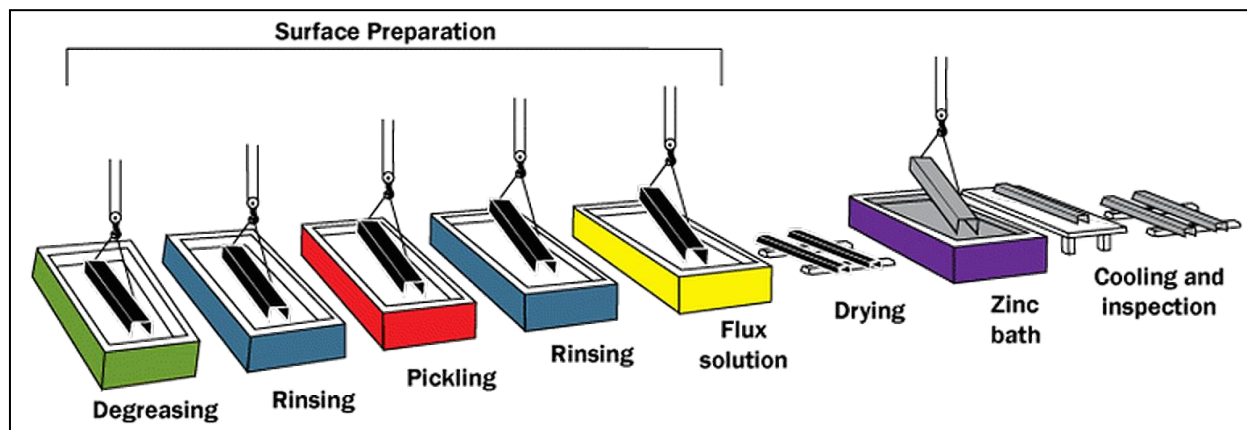
Finishing: This process includes marking (trade mark), painting if it's required and packing. It will pack with thick wood and bundled with steel belt.

Ductile Iron Metallurgy: Ductile Iron is an iron with elementary alloy such as carbon, Si, Mn and Mg. Commonly, the carbon content on its structure is 3% or more. Ductile iron is one of the most important engineering materials, in view of its excellent cast-ability, significantly better mechanical properties and low cost. Simply, it's similarly to steel in strength, toughness, ductility and hardness.

2.7.10 GALVANISING PLANT

The company has planned to set up the Continuous Galvanizing Line of capacity 1X60,000 TPA for production of galvanized (Zinc coated) finished products.

The hot dip galvanizing process involves cleaning of steel components and immersing it in molten zinc to obtain an anti-corrosive coating. Hot dip galvanizing is the process of coating iron or steel with a layer of zinc by immersing the steel components in a bath of molten zinc at a temperature of around 450 °C (842 °F).



SURFACE PREPARATION:

DEGREASING:

A hot alkali solution, mild acidic bath, or biological cleaning bath which removes organic contaminants such as dirt, paint markings, grease, and oil from the metal surface. Grit-blasting, sand-blasting is done to remove Epoxies, vinyl, asphalt, or welding slag, which cannot be removed by degreasing. (Common in both Hot Dip Galvanizing & Electroplating)

PICKLING:

A dilute solution of hydrochloric acid at ambient temperature removes mill scale and iron oxides (rust) from the steel surface in conjunction with pickling abrasive cleaning is also required some time for non-complex structural steel. Wet Scrubber attached with stack is used to control air pollution in the Pickling Section.

FLUXING:

The final surface preparation step, a zinc ammonium chloride solution removes any remaining oxides and deposits a protective layer on the steel to prevent further forming of any oxides on the surface prior to immersion in the molten zinc.

GALVANIZING:

Further for “galvanizing” steel is completely immersed in a bath (kettle) of molten zinc. Where in the bath chemistry must be of pure zinc and maintained at a temperature approximately 840°F (450°C). While immersed in the kettle, the zinc reacts with iron in the steel to form a series of zinc-iron inter-metallic alloy layers. Once the steel reaches bath temperature the coating is complete. Excess zinc is removed by draining, vibrating, and/or centrifuging after withdrawing from Zinc Bath.

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To maintain the temperature of Zinc Bath in Furnace Burners with Furnace Oil / Gas Fired is utilized. Wet Scrubber attached with Zinc Dust Collection Cyclone & Stack is used to control air pollution in the Galvanising Section.

PASSIVATION:

Then the steel are cooled by immersion in a Passivation solution or water (Quenching). (Common in both Hot Dip Galvanizing). A common practice is to coat a surface with a metal oxide to slow down the oxidation process with regards to Hot Dip Galvanizing thus providing greater corrosion resistance. Passivates may be available in a variety of colors, including yellow, clear-blue black, and green which can enhance the appearance of the material or make parts identification easier.

INSPECTION:

The last phase of the process, inspection, is simple and quick. The two properties of the hot-dip galvanized coating closely scrutinized are coating thickness and coating appearance.

A very accurate determination as to the quality of the galvanized coating can be accomplished through a visual inspection of the material, because as stated earlier zinc will not react with unclean steel. A variety of simple physical and laboratory tests may also be performed to determine thickness, uniformity, adherence, and appearance to ensure the coating is in compliance with specification requirements. (Common in both Hot Dip Galvanizing & Electroplating).

2.7.11 PRODUCER GAS PLANT

The company has proposed to install 4x4000 Nm³/Hr (16,000 Nm³/Hr) capacity producer gas plant.

Producer Gas

Producer gas is fuel gas that is manufactured from material such as coal, as opposed to natural gas. In the United Kingdom, producer gas, also called suction gas, specifically means a fuel gas made from coke, anthracite or other carbonaceous material.

Producer Gas, produced in Producer Gas Plant (PGP) using coal gas technology. This is a clean fuel. The composition of Producer Gas is given below:

CH₄: 1.5%
H₂: 13.0%
CO: 25.0%
CO₂: 6.0%

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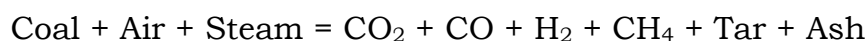
N₂: 53.9%

H₂S: 0.20%

O₂: 0.60%

Net Calorific Value: 1350 Kcal/Nm³

In a fixed bed gasifier, the coal passes downward in counter current direction to gas flow, through various phases (devolatilisation, gasification and combustion zones). Mixture of air and steam is introduced in lower part of gasifier through rotating grate. The basic reaction, which takes place in a typical fixed bed gasifier is:



PROCESS DESCRIPTION

The configuration of gasifiers will be in “cold-clean gas mode”, with “indirect cooling” and separation of tar.

There will be common coal feeding system consisting of a feeding conveyor from ground hopper conveying coal onto the horizontal conveyor on top of battery of gasifiers. The said system of conveyors will supply coal to “top storage bunkers” of individual gasifiers as per process demand.

The coal feeding system of individual gasifiers, consisting of pneumatically operated twin feeding doors, feeds coal into the gasifier reactor from the top storage bunker as per process demand.

Coal is converted into hot producer gas in a water jacketed reactor through a series of thermo-chemical reactions. Water in the water jacket of the gasifiers is converted into steam and then used in the gasification process.

Ash generated during the gasification process travels down into the ash pan placed below the reactor. The ash pan is slowly rotated to facilitate discharge of ash from pan onto the ash conveyor. Ash pan also contains water, into which the bottom of the reactor is dipped. This creates a rotating water seal joint for discharge of ash through the water seal. The ash conveyor carries ash from each of the gasifiers to the ash dump (ash bunker). From the ash dump (ash bunker), the ash will be periodically removed and used in cement plant and brick manufacturing.

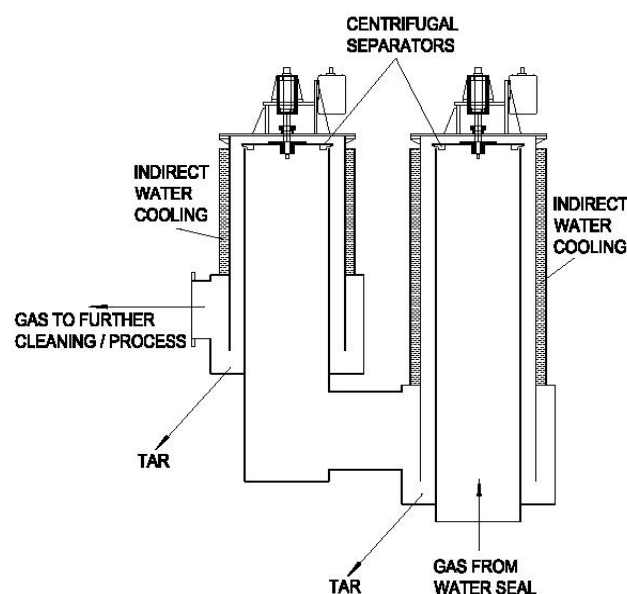
Gas coming out of individual gasifier reactors will be hot and raw. The gas cooling & cleaning system consists of indirect cooling type centrifugal tar separators and electrostatic precipitators.

Hot-raw gas, exiting from the gasifiers will first be cooled and about 80% tar is separated in centrifugal tar separators. Gas from these separators goes to a common

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header to be conveyed to electrostatic tar separators. Tar from centrifugal tar separators gets collected in individual collection pots and then is pumped to tar storage. Cooling water is continuously circulated to tar separators for external cooling of gas. The temperature of cooling water is maintained within limits with the help of cooling towers.

Residual tar in gas is separated out in electrostatic tar precipitators. The tar, so separated, will be first collected in tar pits and then transferred to tar tanks for storage. Tar has a good market value and will be sold to authorized vendor.



Various water seals are used for isolation of gas within the gasifier block, along the gas pipeline and in the gas utilization area. Water used in the seals will be collected when the seals are emptied and the same water is re-used for filling the seals. So, there is no regular disposal of seal water. But there could be occasional disposal of seal-water. Such water (which would contain traces of phenols) would be incinerated in the after burning chambers of sponge iron kilns.

Coal Tar generated from PGP shall be collected using “**Centrifugal Tar Separator**” and will be used as Fuel in DRI Kiln / alternately sold to authorize re-processors. No waste water will be generated from the process.

CENTRIFUGAL TAR SEPARATOR

Indirect Type Centrifugal Tar Separator’ consists of 2 stages of indirect cooling of gas and simultaneous centrifugal tar separation. As can be seen in the figure, gas rises upwards from the water seal into the first stage of separator. At the top of first stage, high velocity centrifugal motion is imparted to gas to separate out droplets of tar. As the gas travels down in the outer annular path, it is cooled by external forced cooling. At the same time, condensed and separated tar travels down along the wall of the annular path. As the gas enters the second stage, it is cooled and therefore tar separation is more effective. Here, again, similar action of high velocity centrifugal separation and indirect forced cooling is repeated.

Phenolic Water, Tar & Tar Sludge recovery system:

Phenolic wastewater generated during the stage of gas cooling shall be charged in the ABC of DRI plant. Over flow water, spillage water will be connected to underground

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tank, where the tar will be settled. Soft water plant will be installed so as PH is maintained. Plant will be designed for Zero discharge and spillage water will be used for spraying on coal and coke if necessitated.

In Indirect Type Centrifugal Tar Separator, there is no direct contact of gas with water. The cooling is done by heat transfer through wall to circulating water. Tar is removed by centrifugal action without any washing with water. Therefore, phenolic water is not generated in this method of tar separation and the associated water pollution issues are completely eliminated.

Process water will be recycled in the system and over flow of the underground tank will be reused /recycled for the water seals and secondary application in gasifier plant. Occasional disposal of seal-water which would contain traces of phenols would be incinerated in the after burning chambers of sponge iron kilns.

Generated Tar from the proposed producer gas plant will be temporarily stored at an isolated location inside the plant premises. Storage capacities for Tar will be around 60 Mt. Finally, it will be sold to authorized re-processors approved by SPCB / CPCB.

Using Centrifugal Tar Separator Producer gas plant and adopting 100% reuse/recycling practice for phenolic water, tar & tar sludge the Company will be adapting closed circuit operation of producer gas plant.

2.7.12 CAPTIVE POWER PLANT

As per Environmental Clearance 2023, 20 MW Power Plant, out of which 10 MW, based on WHR Boiler, utilizing waste heat, generated from the DRI plant which is under operation and another 10 MW, based on AFBC Boiler, utilizing dolo-char, generated from the DRI plant & imported coal will be implemented. Now, the company is planning to install 100 MW capacity power plant, based on 70 MW WHRB Boiler & 30 MW AFBC/CFBC based, utilizing waste heat, generated from the proposed DRI plant. The dolochar to be generated from the proposed DRI Plant shall be utilised in the AFBC/CFBC Boiler for the generation of power. Thus, ultimately after expansion project the total capacity of Captive Power Plant will be 120 MW (80 MW WHRB + 10 MW AFBC + 30 MW AFBC/CFBC).

Process

Waste Heat Recovery Boilers will be installed behind the ABC of proposed DRI kilns in bypass configuration. The flue gases after ABC will be taken to unfired furnace chamber and then flow over banks of super heater, convective evaporator and economizer before being discharged to atmosphere through ESP, ID fan and stack. In the proposed Fluidized Bed Combustion (FBC) boiler envisaged, combustion of fuel particles is achieved in suspension with an inert aggregate i.e. sand. Combustion air

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will be fed through air nozzles from underneath into the sand fuel bed. Oil burner will be provided for start up and low load flame stabilization. The fuel proposed in FBC Boiler is dolomitic. The flue gases will pass over various heat transfer surfaces to ESP and then finally discharged into chimney by ID fan. Condensate extraction pumps will pump the condensate after condenser of STG to a common deaerator. Feed water from the deaerator will be pumped to the waste heat recovery boiler as well as FBC boiler by boiler feed pumps. The steam generated from both the Waste Heat Recovery boiler and AFBC boiler will drive the steam turbine through a common steam header.

Brief description of major plant and equipment

The proposed plant will comprise the following major systems:

- Fluidized bed combustion boiler with auxiliaries
- Steam turbine generator and auxiliaries
- De-aerator and feed water system
- Electrical systems
- Instrumentation and controls
- Compressed air system (service air and instrument air)
- Handling & hoisting facilities
- Plant communication system
- Ventilation and air conditioning
- Fire fighting detection & alarm system

2.7.12.1 Waste Heat Recovery Boiler

After burning chamber (ABC) and Dust settling chamber (DSC) will be located at the exit of DRI Kilns. Part of the dust carried by the waste gases will settle down at DSC. The DSC and ABC assembly will be connected to the DRI Plant Kiln through refractory lined duct.

The combustibles in the waste gases are burnt in the After Burning Chamber which will raise the waste gas temperature thus making the waste gases free from carbon mono-oxide. Provision for spraying water will be made to control the temperature if required. From ABC outlet the WHRB will be connected through a refractory lined duct. An emergency stack cap on the top of ABC will be provided for diverting the waste gases to atmosphere when WHRB is under shutdown or break down.

The boiler will be complete with evaporator steam drum, mud drum, bank of super heaters, economizer, atemperator, air fans, ESP, internal piping etc. Soot blowing and super heater atemperation system will be also provided. Boiler will be provided with blow down tanks (IBD, CBD etc), sample cooler.

Flue gas cleaning system

The exhaust gases will be discharged from boiler to ESP and then into the atmosphere through induced Draft fan and chimney. The pressure drop in the boiler ducts and

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ESP will be kept to match with the requirement of ID fan. The boiler will be of semi out door type with a weather canopy and side covering of trapeze corrugated steel sheets or other suitable materials as available.

The gases passing out of WHRB will be passed through one multi-field Electrostatic Precipitator before escaping the gas, having huge quantity of dust particles, into the atmosphere. The ESP will be installed between the WHRB and the stack. The dust content in gas down stream of ESP shall be limited to 30 mg/Nm³. The ESP Unit will be provided with transformers, rectifier and controls. The dust particles will be collected below ESP in hoppers and conveyed by means of conveyors or pneumatically and stored in silos. This will be subsequently disposed by trucks.

Steam Turbine generator:

There will be total two TGs with the total capacity of 60 MW. The broad description of the steam turbine generator envisaged is indicated below:

The Steam turbine will be single, Horizontal, Singled bleed condensing type. The set shall be complete with gear box, Barring gear box, condenser, air evacuation system condensate extract pumps, generator cooling systems, gland sealing with gland vent condenser and lube oil system. Condensing steam turbine generator with inlet steam parameter of 66 ata and 465+/-5°C at emergency steam valve inlet is provided.

Conversion of Heat Energy in Steam to Mechanical work will be done by expanding the same in Steam Turbine which shall provide mechanical energy in the form of rotational torque. Steam while passing through various stages of Turbine will release both pressure and temperature and ultimately dumped to Condenser at near vacuum condition. Low pressure steam will be condensed by Air in Air Cooled Condenser. Condensed Water from the Air Cooled Condenser will be fed back to Boiler through Air Ejector, Gland Steam Condenser and Deaerator for re-regenerative heating and air removal. Boiler Feed Pump shall take suction from Deaerator and feed deaerated water to Boiler Economiser.

Deaerator and feed water system:

There will be a deaerator with feed tank. 2 numbers boiler feed water pumps with motors (1 working + 1 stand by) shall be provided along with common suction header, auto recirculation valve, suction/discharge valve, non-return valve, pressure gauge, temperature gauge etc.

Electrics:

The electrics include generators, transformers, switchgear – main and auxiliary, battery room etc.

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Instrumentation & Control:

Effective control and measurement of process parameters along with data acquisition system in the control room has been envisaged.

Auxiliary Services:

Auxiliary service systems such as ash handling, EOT crane, telecommunication, air conditioning and ventilation shall be adequately envisaged.

Ash Handling:

Ash handling plant system design would be based on above estimated figures and bottom and fly ash equipment parameters would be guided by the following:

The fly ash from the proposed boilers will be collected in economizer hoppers, air heater hoppers, ESP hoppers and will be conveyed through dense phase pneumatic conveying system to silo. The fly ash to be disposed from the silo will be moistened to reduce the dust while collecting the ash. The system will be provided with telescopic chute and rotary feeder for loading the ash into covered trucks.

Bottom Ash: Bottom ash from proposed boilers will be carried through a submerged belt conveyor to silo. From Silo it will be disposed to ash storage area in covered trucks in moistened condition.

Indicative process flow diagram of WHRB based & AFBC based captive power plant is presented in below in **Figures-3.4**.

Indicative process flow diagram of WHRB based and AFBC based captive power plant are presented in below:

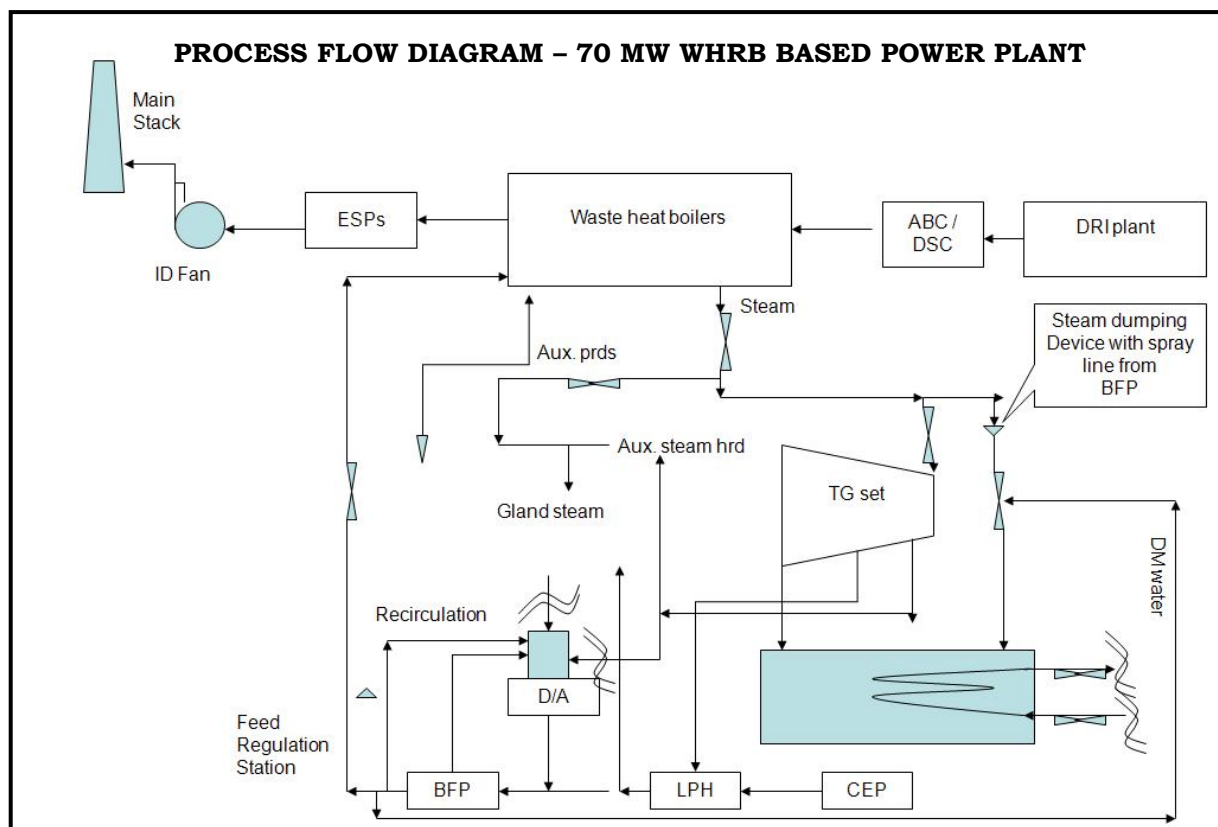


FIGURE-2.7 : PROCESS FLOW DIAGRAM OF WHRB BASED POWER PLANT

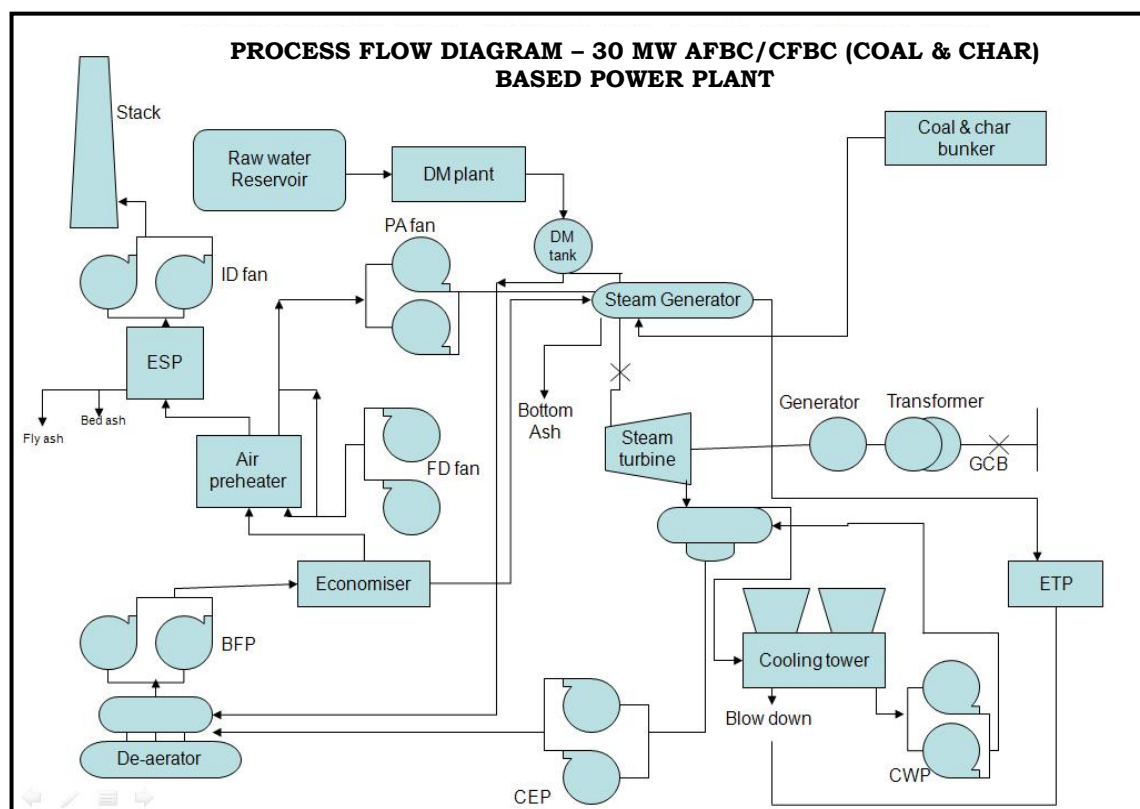


FIGURE-2.8 : PROCESS FLOW DIAGRAM OF AFBC/CFBC BASED POWER PLANT

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2.8 UTILITIES

2.8.1 STORAGE FACILITIES

The raw materials will be stored in the raw material yard from where they will be conveyed to the stock house kept in day bins by feeding into ground hopper and conveyors.

2.8.2 AIR CONDITIONING SYSTEM

The air-conditioning system is proposed to be designed to maintain the following conditions in the spaces serviced:

25±2°C dry bulb temperature and 55±5 percent relative humidity for control rooms, control pulpits, computer rooms, PLC rooms, laboratory etc. To meet the above requirement, air handling units using chilled water, package type air conditioning unit complete with compressor, condenser and duct-work are envisaged. AC units/AHUs shall be installed in separate rooms adjacent to various conditioned spaces served. Conditioned air from AC units to the spaces served shall be provided by plenum/ductwork. Wall mounted window model air conditioners have also been envisaged in some areas for the purpose of air conditioning.

2.8.3 OXYGEN SYSTEM

Oxygen required for general purpose welding and cutting operations shall be met by oxygen cylinder which shall be provided near the respective plant units. The cylinders shall be provided with necessary cylinder valve and suitable manifold to a distribution piping network upto the respective consumption points.

2.8.4 POWER

The estimated total power requirement after expansion will be around 223.5 MW which will be sourced from the 120 MW capacity captive power plant & rest from DVC.

Unit wise power breakup for the proposed units is tabulated in **Table-2.3**.

Table-2.3: Power Requirement

Sl. No.	Description	Existing Units (MW)	Units under implementation / To be implemented (MW)	Proposed Units (MW)	Total after expansion (MW)
1	Sinter Plant (1X0.5 MTPA)	-	-	3.5	3.5
2	MBF (1X500 M ³)	-	-	11	11
3	Sponge Iron Plant (1x400 TPD + 3x650 TPD DRI Kilns)	1.5	-	7	8.5
4	Induction Furnace with matching LRF & CCM (4x15 T + 2X10 T + 6x25 T)	14	17	60	91
5	Electric Arc Furnaces with matching LRF/VOD (1x25 T)	-	-	25	25
6	Ferro Alloy plant (3x12 MVA) and 20 TPH Chrome Ore Briquetting Plant	-	-	38	38
7	Rolling Mill (0.492 MTPA)	1	3	6	10
8	Lime Plant (250 TPD)	-	-	1	1
9	Oxygen Plant (225 TPD)	-	-	5	5
10	Ductile Iron Pipe (DIP) Plant (0.5 MTPA)	-	-	9	9
11	Galvanising Unit (60,000 TPA)	-	-	2	2
12	Producer Gas Plant (16,000 Nm ³ /hr)	-	-	0.5	0.5
13	120 MW Captive Power Plant	1	1	10	12.0
14	Others Aux Load, Admin Office, Store, Lighting Load	1	2	4	7.0
Total		18.5	23	182	223.5

2.8.5 FUEL

For meeting the requirement of Light Diesel Oil (LDO) for various producing modules of the plant, adequate infrastructure in terms of tanks, pumps, pipe lines and dispensing units have been set up which shall be further augmented to meet the requirements of the proposed expansion project. The required fuel is being sourced locally from Indian Oil Corporation. Two (2) nos. of fuel storage tank will be installed having 25 KL capacity of each for the meeting the requirement of the proposed expansion project.

2.8.6 WATER SUPPLY FACILITIES

Daily water requirement for the entire project after expansion will be around 3834.5 m³/day (Existing Units & Units under Implementation / To be implemented – 509.5 Cu.m/day, Proposed Units - 3325 Cu.m/day), out of which fresh water requirement is 3134.5 m³/day and recycle water is 700 m³/day. The water will be sourced from Damodar River through DVC supply.

Water systems of the Plant shall comprise of the following:

- Make-up water
- Re-circulating water
- Once through water
- Emergency water
- Drinking water
- Fire water
- Dust suppression water

Water will be mainly required for cooling of equipment, dust suppression etc. Space provision has been kept in the Plant General Layout for installation of an intake well pump, raw water treatment plant, ground reservoir etc.

The estimated unit wise make up water requirement for the overall project scenario are given below in **Table-2.4**. Overall Water Balance Diagram is presented in **Figure-2.6**.

TABLE-2.4 : ESTIMATED WATER REQUIREMENT

Sl. No.	Description	Existing Units (m ³ /day)	Units under implementation / To be implemented (m ³ /day)	Proposed Units (m ³ /day)	Total after expansion (m ³ /day)
1	Sinter Plant (1X0.5 MTPA)	-	-	250	250
2	MBF (1X500 M ³)	-	-	970	970
3	Sponge Iron Plant (1x400 TPD + 3x650 TPD DRI Kilns)	65	-	320	385
4	Induction Furnace with matching LRF & CCM (4x15 T + 2X10 T + 6x25 T)	32	42	155	229
5	Electric Arc Furnaces with matching LRF/VOD (1x25 T)	-	-		
6	Ferro Alloy plant (3x12 MVA)	-	-	150	150

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	and 20 TPH Chrome Ore Briquetting Plant				
7	Rolling Mill (0.492 MTPA)	4	24	50	78
8	Ductile Iron Pipe (DIP) Plant (0.5 MTPA)	-	-	200	200
9	Galvanising Unit (60,000 TPA)	-	-	50	50
10	120 MW Captive Power Plant	158	159	1100	1417
11	Domestic	15.5	10	80	105.5
Total		274.5	235	3325	3,834.5

Raw water treatment plant will be installed for pre-treatment of raw water and the clarified water will be pumped through MS pipeline to the proposed units.

Drinking water system

Raw water after necessary clarification and filtration through gravity filter will be chlorinated and stored in the drinking water storage tank and will be pumped to an overhead tank. Drinking water from this overhead tank will be supplied to various consumers of the steel plant by means of a piping network, completed with valves, fittings and appurtenances.

Fire fighting water system

The fire-fighting water network will be provided with adequate number of yard hydrants and in-shop landing valves to combat fire hazards in the plant.

To ensure availability of water at designed pressure for fire fighting, electric motor driven and standby diesel engine driven pump sets will be provided. Main electrical driven fire fighting pumps and diesel engines driven standby fire fighting pumps will be provided for fire fighting purpose. In case of fire, the main firefighting pump will pump firefighting water to the hydrants. An independent piping network will be provided complete with pipelines, valves, hydrants, fittings and appurtenances for the said purpose.

Raw water treatment and filtration plant

A raw water pump house of RCC construction along with treatment plant, filtration plant and make-up water pump house is proposed to be provided at raw water reservoir to meet the make-up water requirement of these units. Make-up water will be pumped through MS pipeline to different plant consumers.

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Overhead tanks

Overhead tanks will be provided for supply of emergency water to critical consumers for a short duration in the event of interruption in normal cooling water supply. The overhead tanks will be multi-compartment type, each compartment serving emergency water requirements of individual consumers.

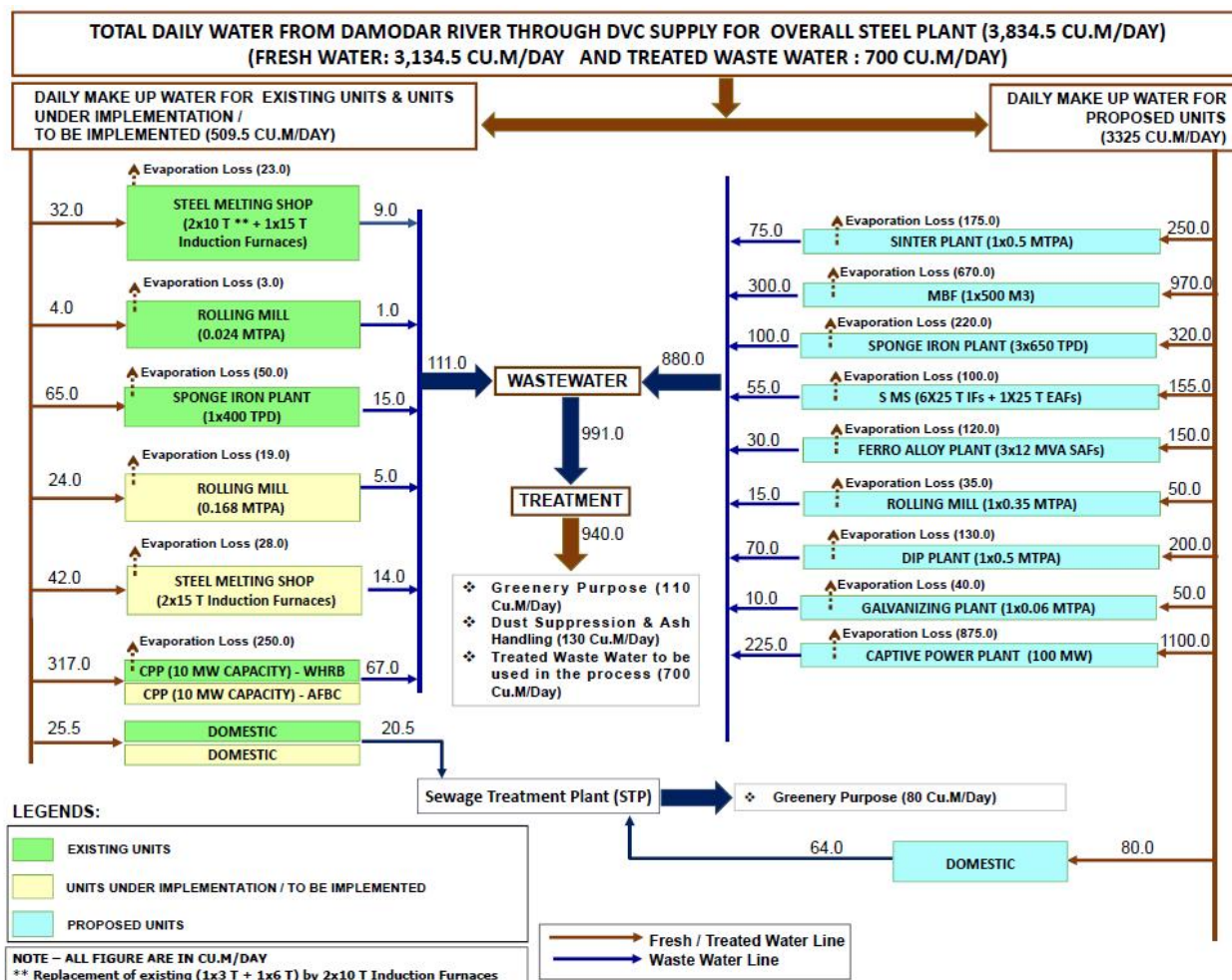
Water Pollution Control

Waste water generated from the different areas of the plant will be treated to the desired extent in suitable treatment facilities and recycled back to the process, as far as practicable, facilitating adequate reuse of-water in the respective recirculating systems and economizing on the make-up water requirement. Domestic waste water will be treated in septic tank-soak pit system. The water thus collected shall be used for dust suppression at raw material handling system, landscaping etc. Thus, Water system will be designed for **“Zero Liquid Discharge (ZLD)”** wherein all discharges will be treated and reused in the plant.

The proposed captive power plant will employ air cooled condenser which will drastically bring down the water requirement.

The Boiler blowdown will be controlled to maintain system solids loading within normal limits for proper water chemistry. The effluent will have less than 100 ppm suspended solids and will be led into the station sump mix with other station effluents to reduce temperature and utilized for disposal of ash in slurry form.

Surface run-off will be settled in a settling basin prior to reuse/ disposal.

**FIGURE-2.6 : OVERALL WATER BALANCE DIAGRAM**

2.8.7 FIRE FIGHTING FACILITIES

Fire protection system for the integrated steel and power plant comprises an elaborate network of fire brigades, water reservoir, pumps, hydrants, fire engines, sprinkler system, fire alarms, smoke and heat detectors, etc. Portable fire extinguishers of various capacities containing agents such as CO₂, DCP, etc. and will be located at strategic points of the plant. In view of vulnerability to fire, effective preventive and design measures will be taken to minimize fire hazard. The following areas in the plant are mainly susceptible to fire:

- Cable galleries.
- Electrical switch gear / MCC room.

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- Coal handling areas; conveyors, transfer points, tunnels and storage yard
- Transformers and turbine oil tank
- Liquid fuel storage tank

For containment of fire and preventing it from spreading in cable galleries, section wise fire barriers with self-closing fire resistant doors will be provided. The ventilation systems, if any, provided in cable galleries will be interlocked with the fire alarm system, so that in the event of a fire, the ventilation system will be automatically switched off. In order to avoid spreading of fire, all cable entries/openings in cable galleries, tunnels, channels, floors, barriers etc. will be sealed with non-inflammable/fire resistant sealing materials. For detection and protection of the plant against fire hazard, any one or a combination of the following systems will protect susceptible areas:

- Hydrant system
- Medium velocity spray system
- Portable fire extinguishers
- Fire alarm system

Fire hydrant points will be provided throughout the premises. Automatic high velocity spray system will be provided for protection of transformers and cable galleries. Manual medium velocity spray system will be provided for protection of fuel oil and turbine oil storage tanks and coal conveyor galleries. Water for hydrant, spray and sprinkler systems will be supplied from the fire water pumps located in fire water pump house adjacent to Raw Water Reservoir. Adequate number of portable and mobile chemical fire extinguishers will be provided at strategic locations throughout the plant. Fire detection and alarm system will be provided to detect smoke in vulnerable areas of the plant through smoke detectors.

2.9 MANPOWER PLANNING

Operation and maintenance of proposed plant require human resources in different categories like managers, engineers of different discipline like metallurgical, mechanical, electrical, electronics, computer, civil, structural, chemical, etc., highly skilled, skilled and semi-skilled work force in different disciplines, commercial, accountants and financial managers, unskilled labour force, clerical, security personal, etc.

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Factory human resources

In order to operate and maintain the plant facilities, including its technical and general administration needs, the estimated manpower requirement for the proposed units has been estimated to be 1600 persons including 300 Persons permanent and 1300 Persons Contractual. There are already 300 Persons manpower in the existing units. So, the total number of manpower after the expansion will be 2110 Persons.

The above estimate covers the top management, middle and junior level executives and other supporting staff.

2.10 SOLID & HAZARDOUS WASTE MANAGEMENT

2.10.1 SOLID WASTE MANAGEMENT

Solid wastes that will be generated from Induction Furnace are slag and dust. The hot slag generated from Induction Furnaces will be transferred to slag yard after cooling. The slag from Induction Furnace will be used for road construction and land filling purposes after metal recovery from the slag.

Dolo-char from the DRI units will be used in AFBC boiler.

Solid wastes that will be generated from caster are the scales. The scales are collected from the drain and transferred to IF for reuse. The solid wastes from the rolling mill are end cuts and miss rolls, which will be re-used in induction furnace.

The fly ash generated from Captive Power Plant will be sold as a raw material for cement plants and brick manufacturing. The bottom ash from Captive Power Plant will be used as Road construction and Land filling purposes.

Fly ash and bottom ash from ESP and Boiler furnace will be transferred by close pipes to closed silos. From silos that fly ash will be transferred in closed trucks and then sold to cement and brick manufacturing.

Solid waste generation and its disposal from the proposed units are presented in **Table-2.5**. The Characteristics of solid waste is tabulated in **Table-2.6**.

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TABLE-2.5
SOLID WASTES AND THEIR UTILIZATION

Sl. No.	Type	Quantity in Tons/Year	Utilization
1	Slag from MBF	2,00,000	To be used as raw material in Cement Plant
2	Dolo Char from DRI Plant	2,32,000	To be used in AFBC/CFBC based Boilers for power generation.
3	Hot Slag from Induction Furnaces & Electric Arc Furnaces	1,13,500	Slag from Induction Furnaces & Electric Arc Furnaces after metal recovery in metal recovery plant (slag crusher) will be used for Land filling / Road Construction / Paver block making after metal recovery.
4	Scales, end cuts, miss rolls from CCM as well as Rolling Mill	23,850	To be used in Induction Furnaces.
5	Ferro Manganese Slag	88,800	To be used as a raw material for Silico Manganese Production.
6	Silico Manganese Slag	59,040	To be used for road construction or land filling purposes.
7	Ferro Chrome Slag	53,760	To be used for road construction or land filling purposes after chrome recovery through Jigging Process and after TCLP test.
8	Ferro Silicon Slag	1,600	To be used for cement industries as a raw material & used for medium carbon silico manganese Production purpose.
9	Tar from Producer Gas Plant	5280	To be sold to the Authorised Agencies.
10	Fly Ash from AFBC Boiler	88,800	To be used as a raw material for the cement plant/Brick Manufacturing.
11	Bottom Ash from AFBC Boiler	22,200	To be used for road construction purpose.

2.10.2 ASH UTILIZATION PLAN

The Power generating Companies - as a socially conscious utility, consider utilization of ash produced at its coal based power plant as a thrust area of its activities. At this captive power plant, various avenues for utilization of ash in application areas shall be explored. In order to meet the requirement of Gazette Notification for Ash utilization, the following actions are proposed:

The company shall provide system for 100% extraction of dry fly ash along with suitable storage facilities.

However, it will also explore to use it in other areas as follows:

- To promote use of ash in agriculture / wasteland development – show case project shall be taken up in the vicinity of power stations.
- Mining authorities will be persuaded for use of ash along with its overburden while back-filling of operating mines and also to identify and allot abandoned mines for back filing with ash.
- All government/ private agencies responsible for construction/ design of buildings, development of low lying areas, construction of road embankments etc. within 100 km of the plant area shall be persuaded to use ash and ash based products in compliance with MoEF's gazette notification.

With all the efforts mentioned above – it is expected that fly ash generated at the AFBC based captive power plant will be sold to Cement and Bricks manufacturing Plants.

TABLE - 2.6
TYPICAL CHARACTERISATION OF SOLID WASTES

Unit	Type of waste	Typical Chemistry
DRI Plant	Dolochar	Ash - 65 to 75% Fixed Carbon - 20 to 30% Moisture - 3.5 to 4.5% VM - 1.5 to 2.5% Sulphur - 0.2 to 0.3%
Induction Furnace	Slag	SiO ₂ - 40.59 Fe ₂ O ₃ - 20.05 Al ₂ O ₃ - 13.54 MnO - 11.68 CaO - 7.12
Captive Power Plant	Fly Ash	Color – Gray Sp. Gravity – 2.17 Surface Area – 380 m ² /kg

		Permeability - 2.50×10^{-5} cm/sec Silica as SiO ₂ – 70% Fe ₂ O ₃ – 7% Al ₂ O ₃ +P ₂ O ₅ – 16.5% MgO+CaO – 3% LOI (Unburnt C) – 2% Others – 1.5% Trace Element in mg/kg: Cr : 80 -100 Mn : 60 - 120 Pb : 30 - 60 Zn : 60 - 120 Cu : 60 - 90 Ni : 30 - 60 Co : 10 - 20
Captive Power Plant	Bottom Ash	Color – Blackish Gray Sp. Gravity – 2.25 Surface Area – 330 m ² /kg Permeability - 3.0×10^{-5} cm/sec Silica as SiO ₂ – 68% Fe ₂ O ₃ – 4.5% Al ₂ O ₃ +P ₂ O ₅ – 9% MgO+CaO – 3.5% LoI (Unburnt C) – 11% Others – 4% Trace Element in mg/kg: Cr : 50 -75 Mn : 80 - 150 Pb : 10 - 20 Zn : 30 - 40 Cu : 40 - 50 Ni : 20 - 30 Co : 10 – 12

2.10.3 HAZARDOUS WASTE MANAGEMENT

The hazardous waste generation from the factory will be Used/ Spent Oil. Used oils removed from machineries, gear boxes, compressors etc. and sludge will be collected in drums and temporarily stored in specifically earmarked areas. They will be disposed through the approved agencies.

2.11 POLLUTION CONTROL MEASURES

Sources of air pollution can be broadly divided into two groups – process and non-process. Process emissions would be those which would be emitted during production/operation of the plant, while non-process emissions would be due to different material handling facilities. The main

air pollutants from process emissions would be SO₂, NO_x and to some extent PM while for non- process emission the main pollutant would be PM.

A number of systems have been proposed for air pollution control which will provide safe environmental conditions in the working area and will ensure acceptable air quality in the surrounding area of the steel plant. Different air pollution control facilities / equipment that would be considered include dry fog dust suppression systems, dust extraction systems, bag filters, ESP etc. Cleaned waste gases would be discharged through tall stacks to ensure adequate dispersion and dilution of pollutants.

Captive Power Plant

Contribution to air pollution would be from:-

- a) Particulate emission from the stack as a result of the combustion of Dolo-char & Imported coal,
- b) Ash particles due to their storage/ disposal and handling,
- c) Sulphur dioxide,
- d) Oxides of Nitrogen

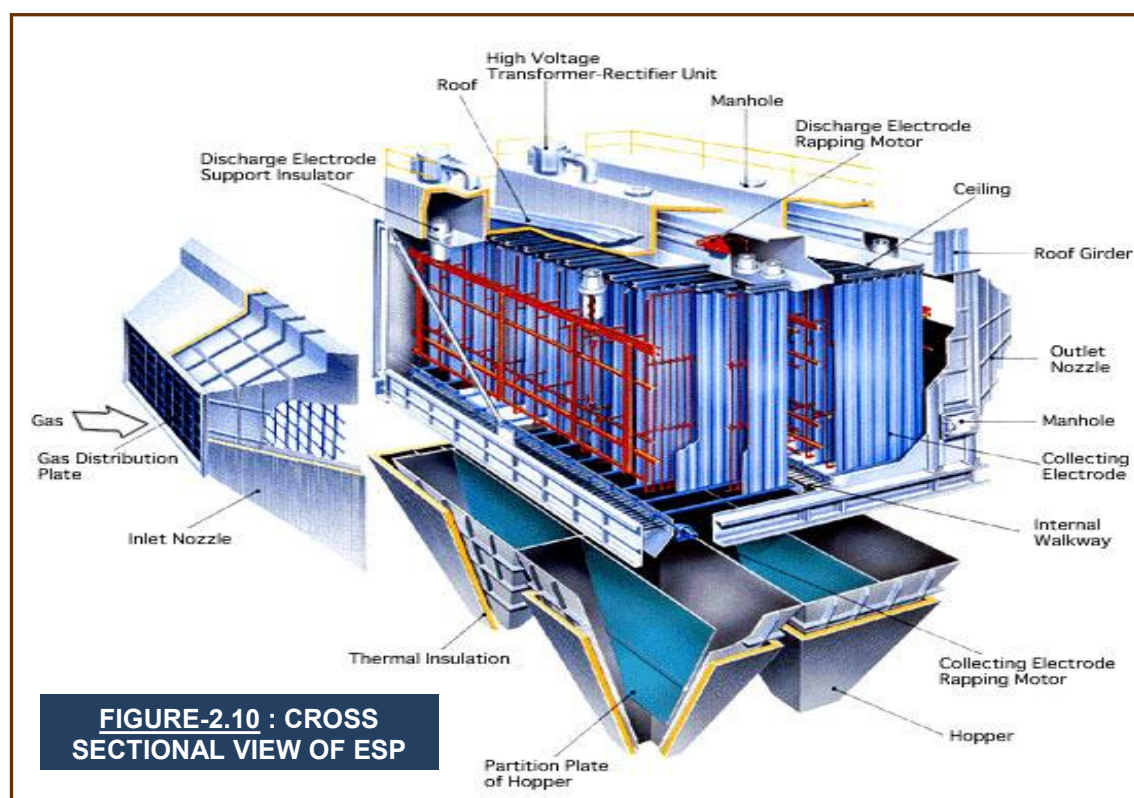
Particulate emission from the stack would be governed according to the Central Pollution Control Board Emission Regulation. Electrostatic precipitators having efficiency of 99.89% or better will achieve the limit of particulate emission below 30 mg/Nm³. As far as coal dust suppression is concerned, water spraying arrangement will be provided at suitable locations. Probable sources of pollution and their mitigation measures have been tabulated below :

TABLE-2.7 : PROBABLE SOURCES OF POLLUTION & THEIR MITIGATION MEASURES

Probable Pollution Sources	Mitigation Measures
Blast Furnace:	
Blast Furnace Gas Cleaning Plant	Dust catcher (cyclone / multicyclone) & Bag Filter
Coal Crushing Unit	Pulse Jet Bag Filter with Stack
Sinter Plant:	
Dedusting of waste gases & Raw Material Section	Electrostatic Precipitator (ESP) at Tail & head & Bag Filter
Sponge Iron Plant:	
Waste Gas from Kilns & Raw Material Section	Electrostatic Precipitator (ESP), WHRB & Bag Filter
Steel Melting Shop:	

Fumes from Furnaces (IF & EAF)	Fume Extraction System, Hood, Spark Arrestor, Reverse Bag Filter
Lime Plant:	
Waste Gas from Kilns & Raw Material Section	Electrostatic Precipitator (ESP) & Bag Filter
Ductile Iron Pipe Unit:	
Fumes from Furnaces	Pulse Jet Bag Filter
Ferro Alloy Plant	
Fumes from SAF	Heater Exchanger with Bag Filter system
Galvanising Plant	
Fumes from the process	Wet Scrubber, Cyclone
Captive Power Plant:	
Dust from the Boilers	Electrostatic Precipitator (ESP)
Unloading of Coal	Rain Gun Sprinkler / Fogging / Mist
Coal Handling area	Bag Filter

With the implementation of all the above control measures, the gaseous emissions shall be contained within the acceptable limits, thus ensuring the full compliance to National Ambient Air Quality Emission Standards issued by the Ministry vide G.S.R. No. 826(E) dated 16th November, 2009.



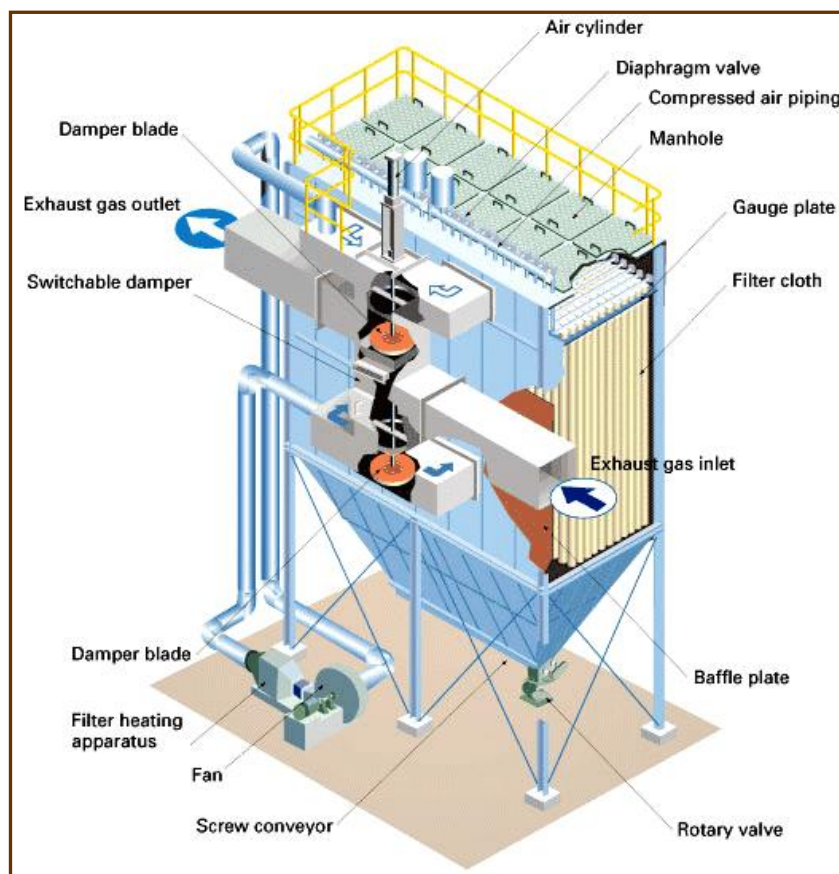


FIGURE-2.11 :
CROSS SECTIONAL
VIEW OF BAG
FILTER

2.12 CONTROL OF FUGITIVE EMISSIONS AT VARIOUS AUXILIARY FACILITIES INSIDE THE PLANT

The unit will install air pollution control equipment to control particulate matter emissions. Fugitive emissions from the proposed plant would be significant as there will be air pollution due to activities like material handling and transfer points of materials and movement of vehicles. These operations generate large quantity of dust. Specific instances of fugitive dust generation may include dust blown by wind from the raw-materials stockpile, dust caused by vehicular traffic within the factory, dust leakage from conveyors, conveyor transport points, storage hoppers and packers etc.. Control measures like good housekeeping, proper maintenance, wetting of dusty areas, use of enclosed storage wherever feasible etc., would considerably reduce fugitive dust.

For the purpose of effective prevention and control of fugitive emissions, following efforts will be made:

- Storage area shall be clearly earmarked.
- Enclosure shall be provided for all the loading & unloading operations, if possible.
- All transfer points shall be fully enclosed.
- Airborne dust shall be control by sprinkling of water.
- All roads shall be paved on which movement of raw materials or products will take place.
- Mobile vacuum cleaners shall be used to regularly clean the roads. Besides, fixed vacuum cleaners shall be used to regularly clean the plant floor areas, roof top etc.
- Leak proof trucks/dumpers shall be used for carrying coal and other raw materials and they shall be covered with tarpaulin.
- Wind shelter fence and chemical spraying shall be provided on the raw material stock piles.
- Preventive measures shall be employed to minimize dust build up on road.
- Conveyors shall be provided with conveyor cover.
- Maintenance of air pollution control equipment shall be done regularly.
- All the workers shall be provided with disposable dust mask.
- Green belt will be developed around the plant to arrest the fugitive emissions.
- Regular training shall be given to the personnel operating and maintaining fugitive emissions control systems.

The fugitive emission will be monitored at following locations within plant area as per CPCB guidelines. Details of such locations are given below:

TABLE-2.8 : LOCATION OF FUGITIVE MONITORING

SR. NO.	AREA	MONITORING LOCATION
1	Raw material handling area	Transfer points
2	Day bin area	Feeder area, Mixing area, Transfer points
3	Product processing area	Furnace area
4	Other areas	As per SPCB guidelines

There will be Dust Extraction/Dust Suppression Systems/Foggy Dust Arresters to control fugitive emissions at Furnace Tapping Points, raw material handling section and various other facilities inside the plant.

Besides, the dust, collected in the bag filter will be used for developing the mound inside the plant boundary, simultaneously greening will be done by growing plants & trees.

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With the implementation of all the above control measures, the gaseous emissions shall be contained within the acceptable limits, thus ensuring the full compliance to National Ambient Air Quality Emission Standards issued by the Ministry vide G.S.R. No. 826(E) dated 16th November, 2009.

2.13 WASTE WATER MANAGEMENT

The prevention and control of water pollution aim at conserving make-up water by recycling the waste water after treatment. The waste water, likely to be generated from the proposed plant is:

- Backwash Waste from Filtration & DM Plant
- Run-off water from Raw Material Storage Yards
- Cooling Tower & Boiler Blow-down
- Sewage & Canteen Effluents

Backwash from Filtration & DM Plant will be led to a clarifier for removing suspended solids. The overflow from the clarifier will be reused in the plant water system. The Sludge from the clarifier will be dried and disposed through local agency.

Cooling Tower & Boiler Blow-down from various recirculation systems will be cascaded for reuse in the process.

Efforts will be made to harvest rainwater in the plant. Run-off water from the office areas, shop roofs will be collected and stored for future use.

The plant will be designed as a **“Zero Liquid Discharge (ZLD)”** plant as far as the process effluents are concerned. The water will be recirculated through cooling and treatment. No plant effluent will be discharged outside the plant premises. The entire waste water will be recycled for various purposes inside the plant.

Domestic effluent from the various buildings/sheds of the plant will be treated in Sewage Treatment Plant (STP).

Sewage Treatment Plant (STP)

Sewage from the various building in the plant will be routed through sewage treatment plant (STP) and treated wastewater will be used for green belt development within the premises.

Sewage treatment plant (STP) based on SBR technology is proposed to be set-up in the proposed project. A well-designed sewer network will

collect wastewater from different sections of the plant area. The sewer network will convey the wastewater into the proposed STP.

The lists of water pollution control systems envisaged are summarized in **Table – 2.9**.

TABLE – 2.9
LIST OF WATER POLLUTION CONTROL SYSTEMS

Source	Pollutants	Control System
Raw material handling yard	Surface runoff containing suspended Solids	To be collected in Pond for further use where no specific water quality is required.
Raw Water Treatment Plant (DM Plant, Softner etc.)	Suspended/Dissolved Solids	
Cooling Tower & Boiler Blow down	Total Dissolved Solids and TSS	
Canteens, Toilets	BOD, O & G, TSS/TDS.	STP

2.14 NOISE POLLUTION CONTROL

Noise generation will be considered while selecting equipment. Equipment would not generate noise more than 85 dB (A) at 1 m distance. Wherever required noisy equipment will be placed on vibration isolators or housed in a separate enclosure or surrounded by baffles covered with noise absorbing material. As the operator would be stationed in the control room, there will be minimum chance of exposure to high noise levels. However, personnel working in high noise zones will be provided with personal noise protection equipment (e.g. ear muffs, ear plugs) and their duty hours will be regulated to control noise exposure levels.

2.15 RAIN WATER HARVESTING

Rainwater harvesting broadly refers to the collection and storage of rainwater and recharge of groundwater. In general, water harvesting is an activity of direct collection and usage of rainwater to reduce the freshwater consumption from the source which is under constant pressure. Otherwise, the precious rainwater will run off, which can be stored for direct use or can be utilized to recharge the groundwater depending upon the technique used for harvesting.

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Rainwater harvesting for the Project:

The scope of rainfall harvesting for plant site has been examined, with the view to supplement the water supply with natural rainwater, which is freely available and to reduce the freshwater conveying and consumption to the maximum possible extent.

The entire land of the plant area has to be leveled in such a way that Rain Water flows down to the Rain Water storage tank. Water will enter into the storage tank through filter bed. Filter bed will be made with different size of gravels and core sand. The filtrate water will be stored in the tank. The residue of the filter bed will be removed manually from time to time. As per guideline of West Bengal Pollution Control Board, no ground water will be recharged in the project area.

Rain Water harvesting potential:

Total Project Area – 30.25 Hectares (74.74 Acres)

Average annual rain fall in the project area - 1400 mm

Average annual monsoon rain fall - 80% of 1400 mm = 1120 mm (say)

Volume of surface run off in the plant campus

= $30.25 \times 1.12 \times 0.4 \text{ ham} = 13.552 \text{ ham say } 0.1355 \text{ mcm}$

Rain water harvesting potential of the plant campus – 0.1355 mcm

85% run off may be allowed to be drained through natural drainage system. For its sustenance, the remaining 15% may be harvested and stored suitably. Around 0.0203 mcm (i.e., 20,328 cu.m) of water therefore can be conserved within the proposed plant. Considering the average depth of 4.0 m in storage Pond, area for surface storage involves around 0.508 ha (1.12 acres).

Rain Water Harvesting through Ground Water recharging

Apart from Surface storage of rain water, there is plan for rain water harvesting through recharging of ground water in the surrounding villages.

Ground Water Recharging System:

There will be Single Silt Trap Chamber of 4 feet diameter. Single Recharge chamber of 2-3 meter depth with 30-60 meter Boring inserted with specially perforated 6" Diameter PVC Pipe rain water harvesting with injection recharging system will be provided.

Potential:

Underground water recharging rate will be @15 m³/Hour or 360 KLD. In normal course of rainfall, rain water will be recharged and excess water will overflow. In case of abnormal huge rainfall, the excess water will be passed through overflow drainage system. The above single system can recharge rain water upto 48,600 Cu.m/Annum.

The company will develop 4 ponds in the nearby villages to store around 1,20,000 cu.m. rain water.

To recharge 6,31,800 cu.m rain water, 13 recharging systems shall be installed in nearby villages.

Rain Water Harvesting

Description	Water Volume
Water Conservation through RWH:	
RWH through surface storage inside the plant area.	20,328 cum
RWH through Surface Water Storage outside the plant by creating four (4) Nos. of Ponds (@ 30,000 cu.m of each pond) in the nearby villages.	1,20,000 cum
RWH through ground Water recharging in the surrounding villages (13 nos. Recharging System)	6,31,800 cum
Total Harvested Rain Water	7,72,128 cum

2.16 STORM WATER MANAGEMENT

The effectiveness of the drainage system depends on proper cleaning of all drainage pipes/channels. Regular checking will be done to see that none of the drains are clogged due to accumulation of sludge/sediments. The clogged drains will be cleaned as soon as possible, preferably the same day. The catch-pits linked to the storm water drainage system from the raw material handling areas will be regularly checked and cleaned to ensure their effectiveness. This checking and cleaning will be rigorous during the monsoon season, especially at the time of heavy rains forecast.

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2.17 LAND & GREENBELT DEVELOPMENT

The proposed project will be installed on the available land within the existing plant area as well as on the additional land adjacent to its existing plant premises comprising of total 30.25 Hectares (74.74 Acres) land.

Out of the total land of 30.25 Hectares (74.74 Acres), 20.82 Hectares (51.44 acres) private land are already acquired. The remaining 9.43 Hectares (23.30 acres) is in the process of Acquisition.

The land is industrial in nature. The land is generally flat and does not come under flood zone. Same plot of land will be reformed/developed from its existing land use.

As there is no human settlement in the whole projected land for the proposed expansion project, there is no need of Resettlement and Rehabilitation (R&R) Plan and setting up of the project would not alter the current land use pattern. The land use break-up of the project site is given below:

Trees filter particulates and are effective as sink of pollutants. Tree also reduces noise level and regulates the oxygen balance in the area by consuming released carbon dioxide. Hence, green development shall be part of pollution control measure adopted in the open spaces in the plant area.

In order to enhance land use as well as to compensate for any loss in ecology during construction, adequate plantation programmes in and around the project site have been planned and shall be adopted with plantation of adequate number of trees.

Considering the need of open space for fire fighting and safety requirement, greenbelt has been planned along the periphery in addition to small patches of green area in the un-utilized open space, roadside tree plantation and grass lawns. The peripheral green belt varies in width to suit the plant design requirement. The greenery is shown in the plant layout (refer **Figure-2.2**).

The proposed project will be installed on the available land within the existing plant area as well as on the additional land adjacent to its existing plant premises comprising of total 30.25 Hectares (74.74 Acres) land. 33% of the total land area i.e. 9.98 Hectares (24.66 acres) shall be earmarked for greenbelt development out of which 3.30 hectares (8.16 acres) of land

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is already developed as greenbelt where around 8250 number of trees have been planted till date.

2.18 CHARTER ON CORPORATE RESPONSIBILITY FOR ENVIRONMENTAL PROTECTION (CREP): INTEGRATED IRON & STEEL INDUSTRY

The Charter on Corporate Responsibility (CREP) as laid down by Central Pollution Control Board (CPCB) for Integrated Iron and Steel Industry will guide the production in the proposed steel plant.

Management Initiatives for Charter of Corporate Responsibility as follows:

Table-2.12
CORPORATE RESPONSIBILITY FOR ENVIRONMENT PROTECTION

SN	Unit / Item	Responsibilities	Extent of fulfillment
1.	DRI	Utilisation of dolochar & waste gas	Waste gas shall be used in the WHRB and dolochar shall be used in AFBC boiler of CPP.
2	SMS	To reduce fugitive emission by installing a secondary de-dusting system	Secondary de-dusting facility envisaged to reduce the fugitive emission
3.	SMS	Utilization of SMS Slag	100% utilization will be explored
4.	Stack & AAQ	Installation of Continuous stacks monitoring system & its calibration in major stacks and setting up of the online ambient air quality monitoring Stations.	Effort will be made
5.	APCS	To operate the pollution control equipment efficiently and to keep proper record of run hours, failure time and efficiency with immediate effect.	Will be complied

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2.19 PROJECT COST

DESCRIPTION	COST
Total Capital Cost of the Project	Rs. 1652 Crores
Total Capital Cost for Environmental Pollution Control Measures	Rs. 100 Crores
Recurring Cost / annum for Environmental Pollution Control Measures	Rs. 10 Crores

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CHAPTER-3.0

DESCRIPTION

OF THE ENVIRONMENT

3.1 GENERAL SCENARIO

3.1.1 INTRODUCTION

The proposed expansion project of M/s AIC Iron Industries Pvt. Ltd. is located at Village - Benipur, P.O.: Saltor, Dist. Purulia in West Bengal. Geographical Co-ordinates of the Project Site are ranged from Latitude: 23°39'21.74"N to 23°39'43.56"N and Longitude: 86°47'39.81"E to 86°48'19.26"E with Elevation is about 160 m (524 ft) Above Mean Sea Level (AMSL).

The location of the proposed project site is shown in **Figure-3.1.1**. Google map of the project site & its surroundings is presented in **Figure-3.1.2**. The 10 km radius study area on Toposheet is presented in **Figure-3.1.3**.

3.1.2 SURROUNDINGS

The project site already has proper road linkage for transport of materials and equipment. The nearest Railway Station - Muradi Railway Station is located about 7.2 Kms towards south-south-east direction from the project site. The State Highway-5 (SH-5) (Rupnarayanpur - Junput) is passing around 2.2 Kms towards east-south-east direction w.r.t. the project site. The G.T. Road (National Highway-2) (Delhi - Kolkata) is passing around 8.7 Kms towards north-north-east direction w.r.t. the Project Site. The proposed project site is well developed and has all necessary infrastructure facilities like motorable road upto the plant site, nearness to rail head, telephone facilities etc.

The Nearest Town - Kulti is located about 10 Kms towards North-east direction from the Project site. Industrially developed city - Asansol is located about 16 Kms towards East direction w.r.t. the Project site. Puruliya, the District Headquarter is located around 57 Kms in South-west direction from the project site.

The major river in the study area is the River Damodar which passes around 2.8 km towards North-northwest direction w.r.t. the Project Site. The nearest Airport - Kazi Nazrul Islam Airport, Andal is located about 46 Kms in East direction w.r.t. the project site and the Netaji Subhas Chandra Bose International (NSCBI) Airport, Kolkata is located around 202 Kms from the project site.

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3.1.3 COVERAGE OF THE STUDY AREA

The EIA is aimed for determining the environmental impacts on the "Study Area", which encompasses all areas falling within a radius of 10 km around the proposed project site. The entire study area is located within Purulia and Bardhaman districts. There are no eco-sensitive areas like National Parks, Wildlife Sanctuaries, Biosphere Reserves, Migratory Corridors of Wild Animals etc. found within the 10 km radius study area. But, there is a major forest i.e., Panchet Forest located on the Garh Panchkot Hill within the study area. The nearest distance of the Panchet forest/ Garh Panchkot Hill is around 3.2 Km in south-west direction w.r.t proposed project site.

3.1.4 PHYSIOGRAPHY

The whole study area is basically plain land having several medium and small size hills like Garhpanchkot hill, Garangi hill, Parts of Muradi Hill etc. with very dense to medium dense patchy vegetation. Panchet Forest is a dense forest, situated on the Garhpanchkot Hill. The study area can be described as lying on the first step of gradual descent from the table land of Chotonagpur (Ranchi Plateau). The general characteristics are those of an upland area with rolling topography gradually dying out eastward. This rolling topography is characterized by hilly terrain. General elevation of land surfaces of the study area ranges from 300m to 150m, the master slope being towards the East and South-East. The surface features in the undulating plain mostly include high lands alternating with long stretches of low lying areas. Due to undulating nature of the topography, the soil is generally gravelly. Lateritic soil prevails in the uplands. The alluvial areas are found in very narrow strips along the rivers. The valleys are steep along the rivers. The cultivable lands are mostly located in the low lying areas and on the slope between high and low lands.

The major environmental disciplines studied in this EIA report include Geology and Geo-hydrology, Land Use, Soil, Meteorology, Ambient air Quality, Surface and Ground Water Quality, Noise, Ecology, Demography and Socio-Economic Status.

The following chapters present the detailed discussion on the field data, generated for soil, meteorology, water quality, air quality, noise, ecology, and socio-economic during three months' period (**1st March, 2023 – 31st May, 2023**) along with the relevant secondary data, collected from various agencies on the relevant disciplines like Geology and Geo-hydrology, Land Use, Meteorology and Demography & Socio-Economy.

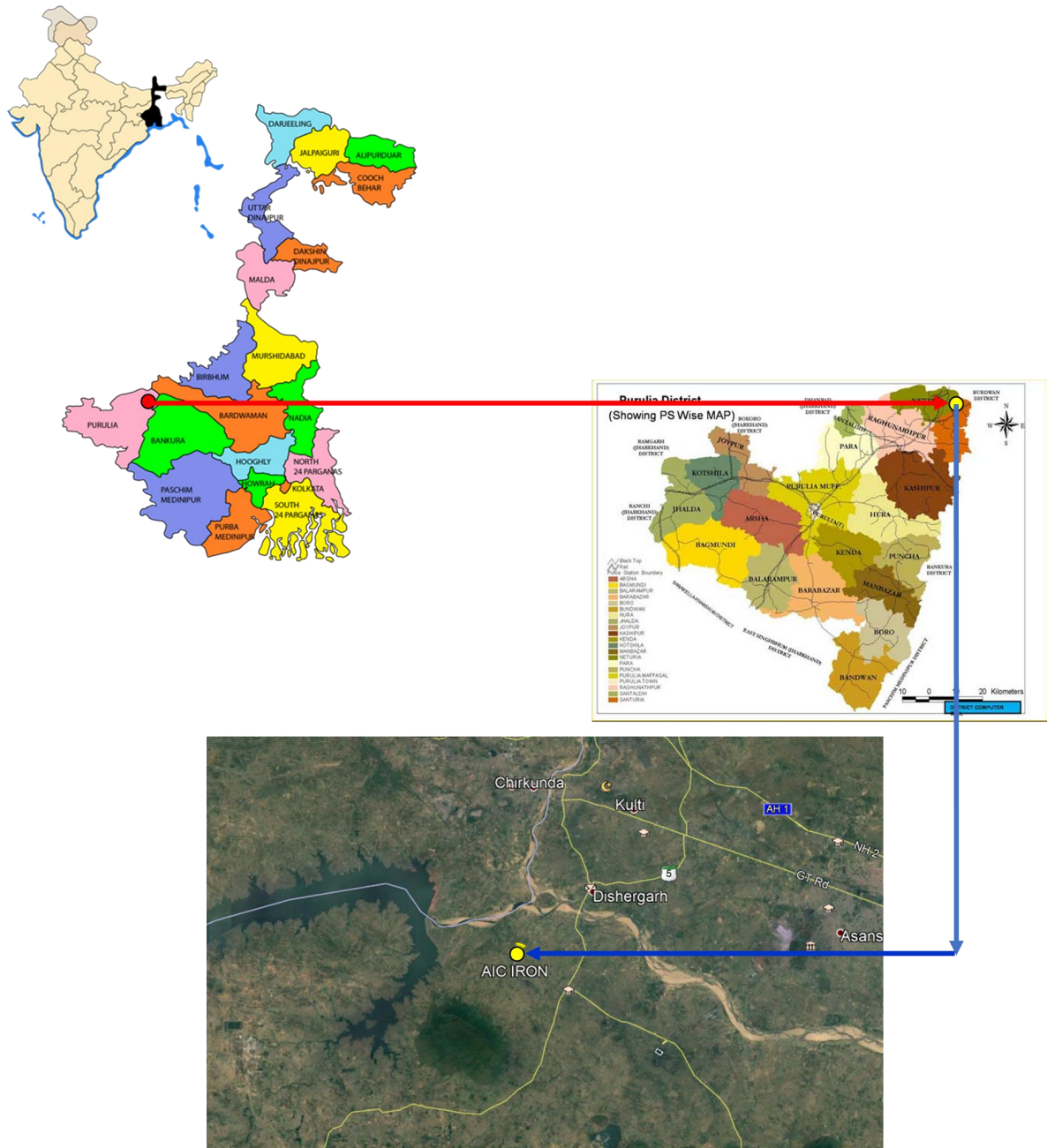


FIGURE-3.1.1: LOCATION MAP
VILLAGE - BENIPUR, P.O. - SALTOR,
P. S. - NETURIA, DIST. - PURULIA, WEST BENGAL
Geographical Locations
Latitude: 23°39'21.74"N to 23°39'43.56"N
Longitude: 86°47'39.81"E to 86°48'19.26"E
Elevation: 160 m (524 ft) Above Mean Sea Level



FIGURE-3.1.2 : GOOGLE VIEW POINT MAP
VILLAGE - BENIPUR, P.O. - SALTOR,
P.S. - NETURIA, DIST. - PURULIA, WEST BENGAL

Geographical Locations
Latitude: 23°39'21.74"N to 23°39'43.56"N
Longitude: 86°47'39.81"E to 86°48'19.26"E
Elevation: 160 m (524 ft) Above Mean Sea Level



**FIGURE-3.1.3
10 KM RADIUS STUDY AREA
ON TOPOSHEET**

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3.2 GEOLOGY & GEO-HYDROLOGY OF THE STUDY AREA

3.2.1 GEOLOGY OF THE STUDY AREA

The study area is under the district of Purulia and Bardhaman in the state of West Bengal. The study area has an average elevation of the land surface ranges from 150 m to 300 m from MSL and the master slope is towards the east and south-east. The study area forms the lowest step of the Chota Nagpur Plateau. The general scenario of the study area is undulating land with scattered hills. The area corresponds to eastern fringe of Chhotanagpur plateau and gradually merges with depositional fluvial terraces of Damodar-Dwarkeswar-Kangsaboti River.

The terrain is especially granite and gneiss with enclaves of metasedimentaries and metabasics. The study area is characterized by undulating topography with rugged hilly terrains. In the eastern and south-eastern part of the area the slope ranges between 10 to 20 m/km. In the central part of the study area the slope is less than 10m/km and forms a depression. Again in the western part the slope is higher and ranges from 20-80 meter per km. The general slope Map of Purulia District has been presented in **Figure-3.2.1.1**. There are about 17 prospects near the study area. 10 are of coloured granite variety (Pinkish grey-pink-dark grey/block) represented by granite, perphyritic granite, granite gneiss. The remaining 7 are of black granite constitutes basic (such as dolerite, gabbro, diorite etc,) and charnockites - basic granulites. The study area is covered by mostly residual soils formed by weathering of bed rocks.

Porphyritic granite, associated with metamorphic rocks and migmatites of East Manbhum (23°27'45" – 23°35' N. Lat.; 86°30' – 86°49' E. Long.), India, crops out as a lenticular body exhibiting well-developed planar banding of alternating feldspar phenocrysts and a finer-grained assemblage of quartz, feldspar and accessories. There are random arrangements of phenocrysts within the banding, or they show perceptible lineation. Lineation, foliation as well as joints are primary. Regional distribution of flow layers indicates an inclined lens.

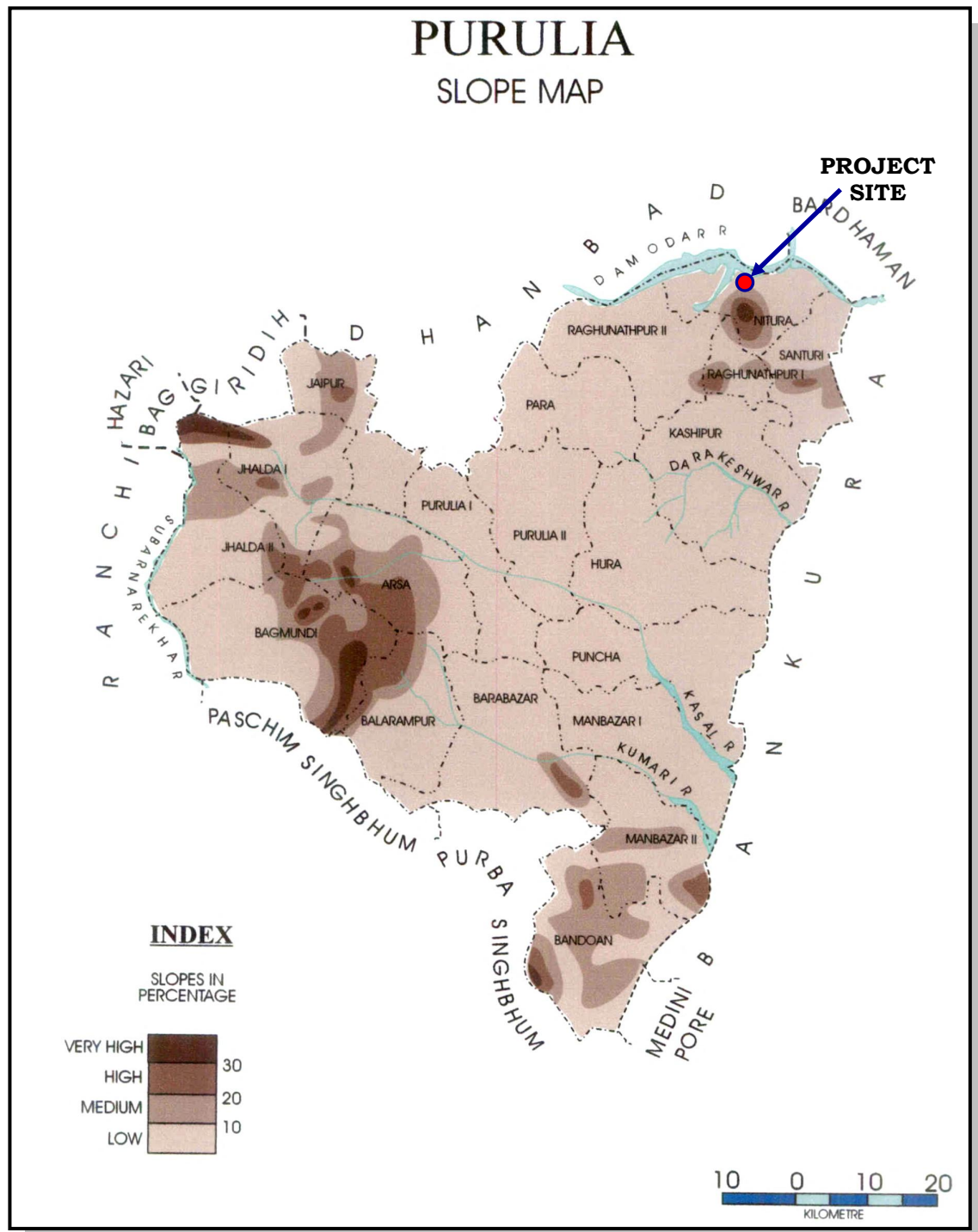


FIGURE-3.2.1.1
GENERAL SLOPE OF PURULIA DISTRICT

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Types and Structure of Rocks:

The porphyritic granite is concordant for the greater length except toward the eastern margin of the exposure. In North-North-East of the study area, it is discordant with the structural trends of the country rocks. There are some small-scale discordances where the granite boundary takes sharp turns, leaving the schistose alignments of the country rocks abutting against the boundary. Spatial distribution of foliation, lineation as well as joints of the porphyritic granite is free of that of the metamorphic and migmatitic country rocks. Wall rocks have been mylonitized, and three joint systems are developed. Distribution and concentration of joints prove that the effect of tension was greater close to the contact.

Lineations in the country rocks are parallel to one another. It is mainly of two types produced by (1) microfolds of different dimensions and (2) alignment of elongated minerals such as quartz or sillimanite. Biotite fabric of the metamorphic rocks is not indicative of their tectonic trend as the mineral is an outcome of neocrystallization. The metamorphic rocks are found in these areas which have been generated due to a high grade of regional metamorphism. Fabric of migmatites, ultramigmatitic granite gneiss, quartz in leptynites (granulites) are very similar to that of the metasediments and their orientation indicates the tectonic orientation during metasomatic recrystallization.

Country rocks show simultaneous fabric reconstitution near the porphyritic granite. Along the granite contact the fabric is symmetrical about the bisectrices of the shear joints as a result of intrusion of porphyritic granite. The intrusion also produced minor secondary folds or intensification of folding. Quartz fabric of the porphyritic granite is independent, with respect to its pattern and relation to geographic coordinates, of the country rock fabric.

The metamorphic rocks of Chhotanagpur Granite belt exposed in Manbazar area near the study area in Purulia district of West Bengal provides an opportunity to study the relation between the deformation as expressed by the complexity of structure and metamorphism in upper greenschist facies. The area forms a part of a large shear zone in the northern part of South Purulia Shear Zone (SPSZ). The major rock types include phyllite, mica-schist, amphibolites, gondite, granite gneiss, augen gneiss, granite mylonite and tourmaline rich pegmatite. The southern part of the area is characterised by the presence of granite, amphibolite and quartz-mica schist. The granites and amphibolites are deformed to variable degrees from simple granite gneiss, through proto-mylonite to mylonite. The mylonitization may be related to the shearing

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along the WNW–ESE trending SPSZ. The schistose quartzite and amphibolites occurs as xenoliths within the deformed granite body. The nature of the parent rock of amphibolite is also debatable; it might be mafic igneous rock occurring as dyke, or impure calc-magnesium sediments. From the field relations it appears that at least some of the amphibolites were doleritic intrusives into the metasediments and older than the granite. Gondite is present as an isolated rock body surrounded by the granite. It is later refolded by the same deformation that has affected the granite.

Purulia district is endowed with mineral resources of a wide range of varieties. As per the findings of GSI, there are 10 types of mineral deposits in this district. The main ones are Coal, Limestone, Rock Phosphate, China Clay, Quartz etc. The main mineral of the district is Coal. There are two big Collieries in Purulia district, one at Ranipur and the other at Parbelia. Deoli and Bhamuria are the other Coal mines. The other important minerals, explored till date are Apatite or Rock Phosphate of Beldi, Panrkidi etc, Limestone of Jhalda, Basemetal of Tamakhun, China clay of Mahatomara, Fire clay of Malti, Quartz of mirmi, Decorative Stone of Bero, Dhunia etc.

Lithology and Geological Units of Purulia District has been presented in **Figure-3.2.1.2.**

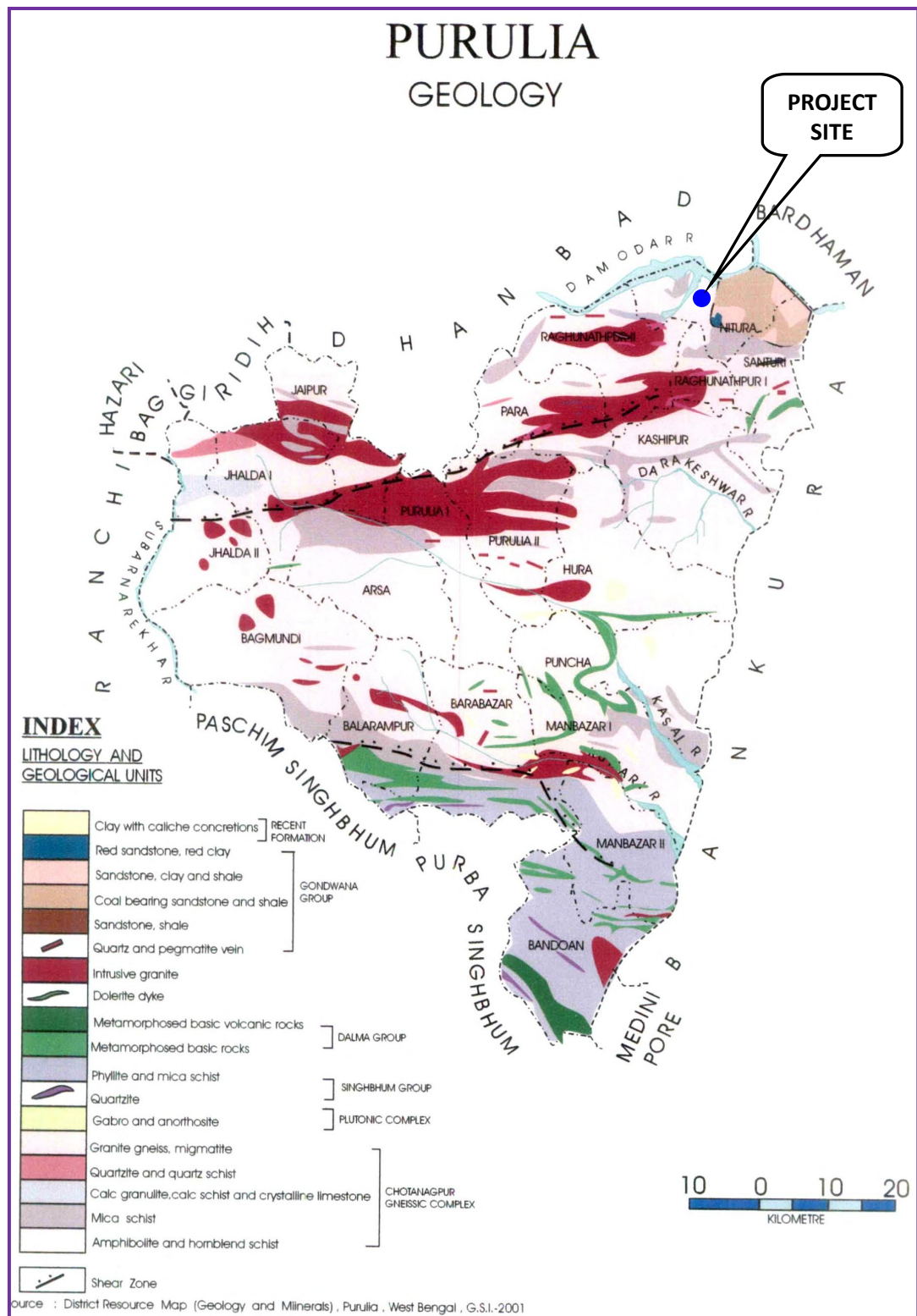


FIGURE-3.2.1.2
LITHOLOGY & GEOLOGICAL UNITS OF PURULIA DISTRICT

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Soils Formations:

The soils of the study area are generally of residual type and derived from the weathered Archean granites, gneisses and schists. Their profile development is disturbed by the long continued erosion. Older alluviums of Pleistocene to sub-recent age exist along the northern base of Bagmundi hills. The newer alluviums of sub-recent to recent age are found along the Subarnarekha, Kasai and Damodar river valleys.

The soils of the Purulia district may be classified into three groups according to their association with geological formations under different geological eras. Each major group is also subdivided on the basis of texture, soil drainage and degree of erosion.

1. Soils associated with Archean Granite - Gneiss landscape.
 - a) Deep well drained to moderately drained sandy loam soils,
 - b) Shallow well drained sandy loam soils,
 - c) Very deep imperfectly drained sandy loam soils,
2. Soils associated with Dharwar landscape.
 - a) Very shallow somewhat excessively drained sandy loam soils,
 - b) Shallow moderately well drained , coarse loamy soils,
 - c) Deep moderately well drained sandy loam soils,
3. Soils associated with Gondwana landscape.
 - a) Shallow imperfectly drained sandy loam soils,
 - b) Shallow moderately well drained sandy loam soil,

The maximum portion of the study area is under the Soils associated with Gondwana landscape.

The soil classification map of Purulia District has been presented in **Figure-3.2.1.3.**

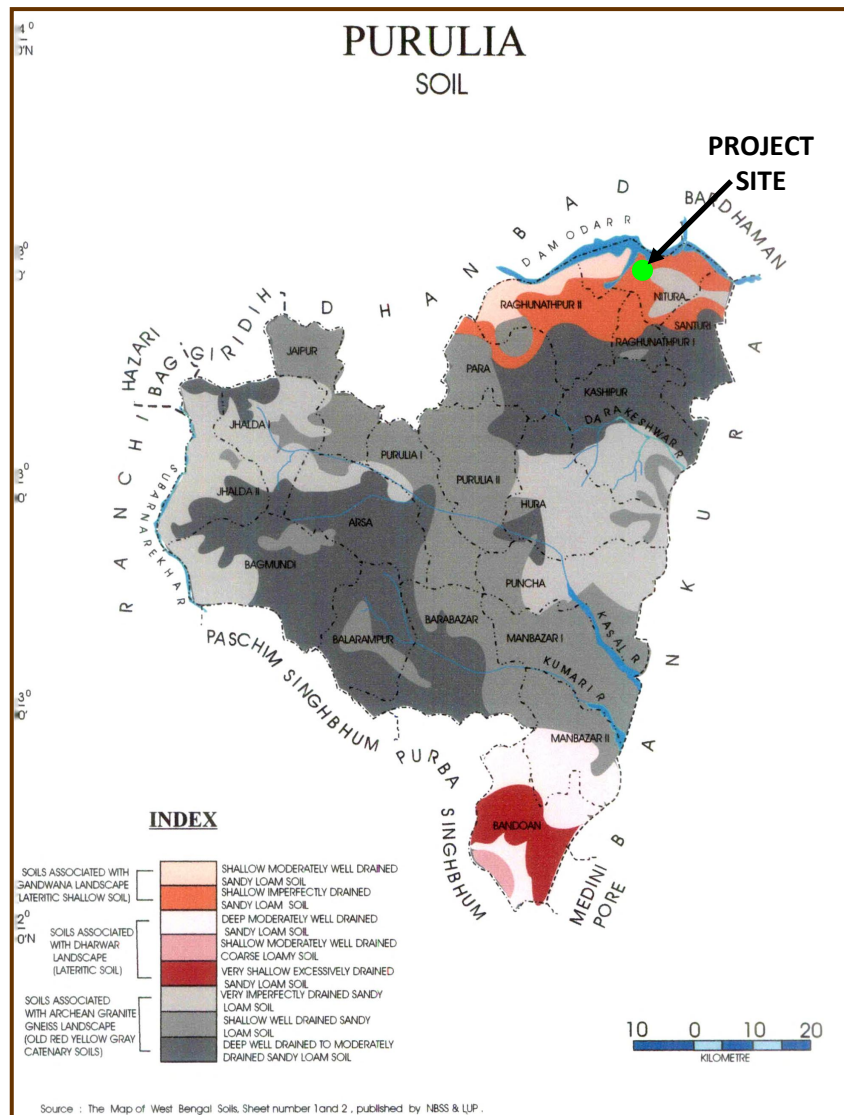


FIGURE-3.2.1.3
SOIL CLASSIFICATION MAP OF PURULIA DISTRICT

3.2.2 GEO-HYDROLOGY OF THE STUDY AREA

The study area is a part of Chhotonagpur plateau and is underlain mainly by Precambrian metamorphics excepting a small area in the northeastern part where sedimentaries of Gondwana age are exposed. Adjacent to major rivers and streams, unconsolidated Quaternary sediments occur as discontinuous patches.

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GEOHYDROLOGY OF GROUNDWATER:

In the study area, groundwater is present at shallow depth under water table condition within the weathered mantle, fractured zone of hard rock as well as narrow zone of unconsolidated sediment along major valleys. The potential aquifers comprise two units, viz (i) a weathered residuum which is in general 8 -10 m thick, porous and unconsolidated, containing water in the interstices and (ii) underlying fractured hard rocks which stored water within zones of the secondary porosity.

Water Table:

The water table in general is at depths varying between 6 and 8 m bgl during pre-monsoon period and between 2 and 4 m bgl during post-monsoon period. In the southern and extreme north-eastern parts of the study area the water table is at depths greater than 8m bgl. Water table, in general fluctuates between 3 m and 4 m bgl. Greater fluctuation of water table is observed mostly in mica schist and Gondwana terrain and relatively lower fluctuation is recorded in granitic terrain.

Potentiality of aquifers and Transmissivity:

Large diameter dugwell pump tests at the study area reveal that the potentiality of the aquifer to transmit water was of low order and transmissivity value ranged between 2.42 and 11.61 m²/day. The specific yield value ranged between 0.79X10⁻¹ and 2.82X10⁻¹ indicating that the aquifers were unconfined in nature. The average yield of dug wells in granite gneiss, mica schist and sandstone formations were 4.80 m³/hr, 0.92 m³/hr and 16 m³/hr respectively.

The potentiality of the aquifers to transmit water is of low order and therefore most of the open dug wells are dried up during peak summer and create a severe scarcity of drinking water. So it has been suggested that the depth of dugwells should be increased and well boring should be done at the bottom of the well to increase the yields.

As per the standard of drinking water (BIS 10500, 1991) the groundwater of the study area is fresh and potable. The Sodium absorption ratio, percent of sodium and electrical conductivity indicate that the groundwater is in general suitable for irrigation of most crops on almost all types of soils.

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SURFACE WATER HYDROLOGY:

Drainage and Density:

Mode of draining water or drainage is an important controlling factor in influencing soil erosion. Generally soil loss or removal is accomplished by running water and that is why it is pertinent to have a discussion on drainage in the study area.

A number of rivers and rivulets drain the district. All the rivers have an easterly or south-easterly course. Only the Subarnarekha flows almost to the south along the western border and receives west and south-west flowing tributaries. Subarnarekha, Damador and Kasai rivers are the perennial rivers. Most rivers and rivulets are non-perennial and subject to occasional flash flood. The river beds are usually covered with gravels and sands. Their banks are abrupt and broken into deep gullies. None of the river is navigable.

The varying underlying geological structure, surface morphometry and stage of evolution together have given rise to a variety of drainage and channel patterns. The most common of these is the dendritic pattern which is found all over the erosional plain. The alignments of the tributaries and sub tributaries of river Kumari, Darakeswar, Kasai and Damodar form dendritic pattern. Radial Drainage pattern is found along the summits of the hills. The major river in the study area is Damodar. The Drainage Map of Purulia District has been presented in **Figure-3.2.2.1**.

Drainage System of the Study Area:

The major surface water bodies in the study area are the Panchet Dam (Reservoir), Damodar River, Barakar River and Khudia River. The River Damodar is mainly perennial in nature, which means it has sufficient water to flow all around the year. The nearest distance of the Damodar River is 2.4 Km from the Project Site. River Barakar is the main tributary of the River Damodar. River Barakar meets with the River Damodar at Fatepur. Khudia River is the main tributary of the River Barakar. The confluence point of the River Barakar and the river Khudia is at Hatinal. Besides, a number of confined water bodies, viz. tanks, ponds, jheels, roadside burrows etc. which form a part of surface hydrological system, exist within the study area. As the River Damodar is the main drainage channel of the region, this river receives pollution loads of industrial and domestic waste water and also agricultural run-off.

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Damodar River:

Damodar River rises in the eastern part of Palamau district of Bihar at an elevation of approximately 600 mtr and has a course of 538 kms before it merges with Hooghly in West Bengal. The basin of this river is surrounded by the granite gneiss of Chotanagpur which is affected by the boundary fault. The Catchments of this river receive an average rainfall of 120 -150 cm of which 90% rainfall occurs during the four months only i.e. June to Sept. of a year. In addition to this, valley receives rainfall from tropical cyclones in the upper catchments plateau part of the area. As mentioned above the concentrated rainfall during the monsoon over gneissic rocks, sandstones and shale under hot and humid climate causes severe erosion of rock materials and thereby loading the water streams with great amount of sediments. This causes choking of riverbed, which in turn results in flooding of surrounding region. Prior to construction of various dams on this river, the region had bad experience of severe floods.

The Panchet Hill dam has been constructed on the Damodar river, 5 kms above the confluence with its main tributary Barakar. One of the right bank tributaries of Damodar is Gobai or Gowai Nadi. There are numerous short non-perennial tributaries of Goabai namely Mas Jhar, Chapai Nala, Parga Nala, Jaria Nala, Falari Jhar, Khukraghata Nala, Taragunia Nala and Harai Nala. Gullies have formed along the banks of all these streams. The middle and lower portions of the Gobai are fully sand choked.

Panchet Dam:

Panchet Dam, constructed on Damodar River comes under the study area. The dam is 22,155 ft. long and 134 ft. high. It is a part of Damodar Valley Corporation. A hydel station has also been constructed against the back ground of Panchet hill in the eastern side of the dam with a generating capacity of 40 MW power. Panchet dam lies on Damodar River 5 kms upstream at the confluence of Barakar and Damodar River and at the western fringe of Raniganj Coalfield in west Bengal.

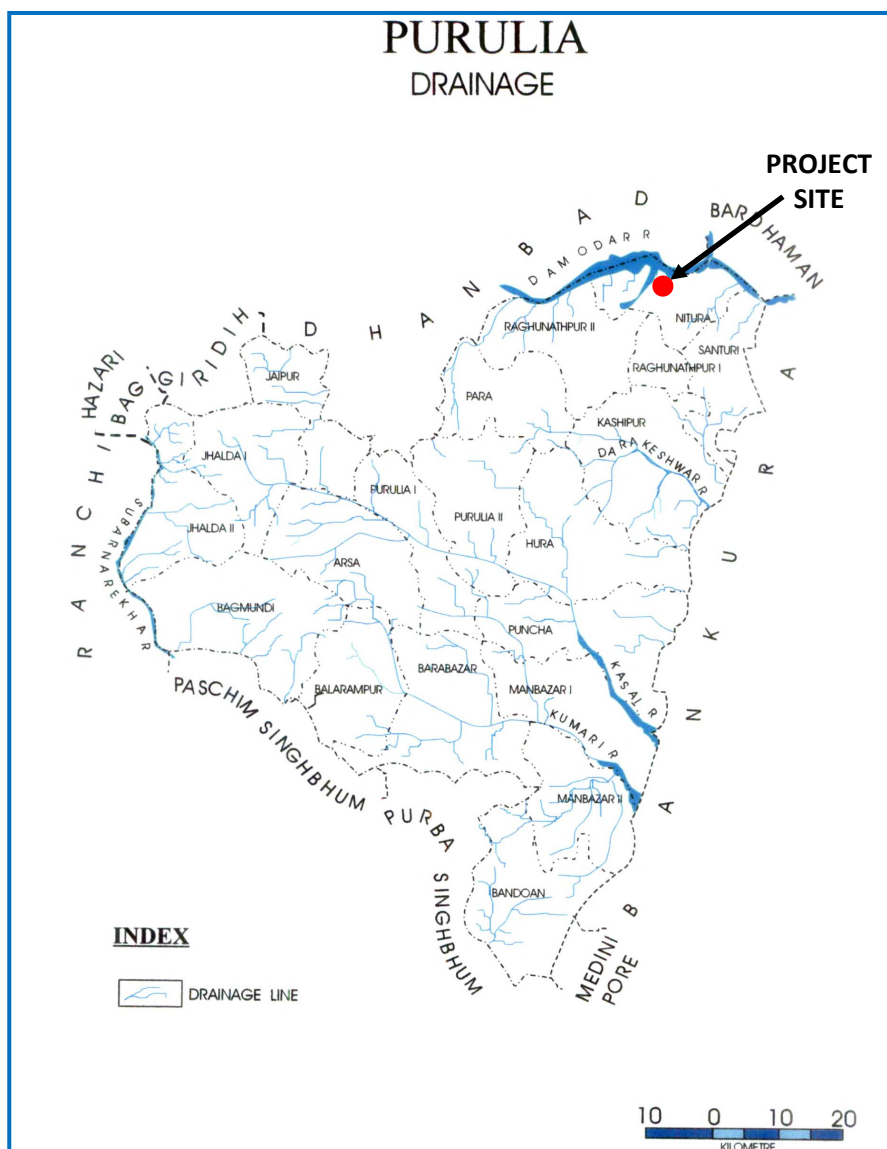


FIGURE-3.2.2.1
DRAINAGE MAP OF PURULIA DISTRICT

MANAGEMENT PLAN FOR RECHARGING THE AQUIFERS AT THE PROJECT AREA

Recharging of the aquifers within plant premises is not applicable for this industrial project. However, efforts would be made for the conservation of surface water and ground water at the project area.

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Management Plan for the Conservation of Surface Water & Ground Water at the Project Area:

Conservation of Surface Water Resources:

1. No garbage dumping will be made near any surface water / ground water resource.
2. Technique of improvement of water quality using aquatic plants and fishes will be introduced where necessary in order to avoid mosquito breeding.
3. No sewage will be diverted to water bodies in order to maintain their water quality.
4. Rain water harvesting system will be introduced at the project site.

Conservation of Ground Water Resources

Efforts will be made to maintain the sustainability of ground water resources by arresting the ground water outflows by Watershed Management.

3.2.3 RAINFALL

As the soil erosion of the study area is influenced by water it is essential to consider intensity, amount and duration of rainfall to assess rainfall erosivity (i.e., R factor) of the area. As per the secondary data, the average annual rainfall is 1322 mm. Maximum rainfall 1427 mm occurs in the hilly part of Bagmundi. In the eastern part the average annual rainfall varies between 1300 mm to 1400 mm. The rainfall generally decreases towards the north-west.

Nearly 80 percent of the annual rainfall occurs during the monsoon period (June - September). The later part of south west monsoon season (September - October) is associated with the tropical depressions originating in the Bay of Bengal. These causes nearly 45 mm of rain in the eastern part and 40 mm in the north-western part .The intensity of rainfall due to these depressions sometimes becomes very great and may cause enhanced soil erosion in the district. During winter, western disturbances generally cause light rainfall. This does not cause any major soil erosion problem. During hot weather season of March to May , rainfall is caused by the Nor'westers or Kalbaisakhis. Kalbaishakhis generally bring sudden rainfall with great intensities. Besides, the season in which it occurs is characterized by the presence of bare soil mostly devoid of vegetation. Therefore it causes considerable amount of soil erosion. A Map showing the rainfall of the Purulia District including the study area is presented in **Figure-3.2.3.1.**

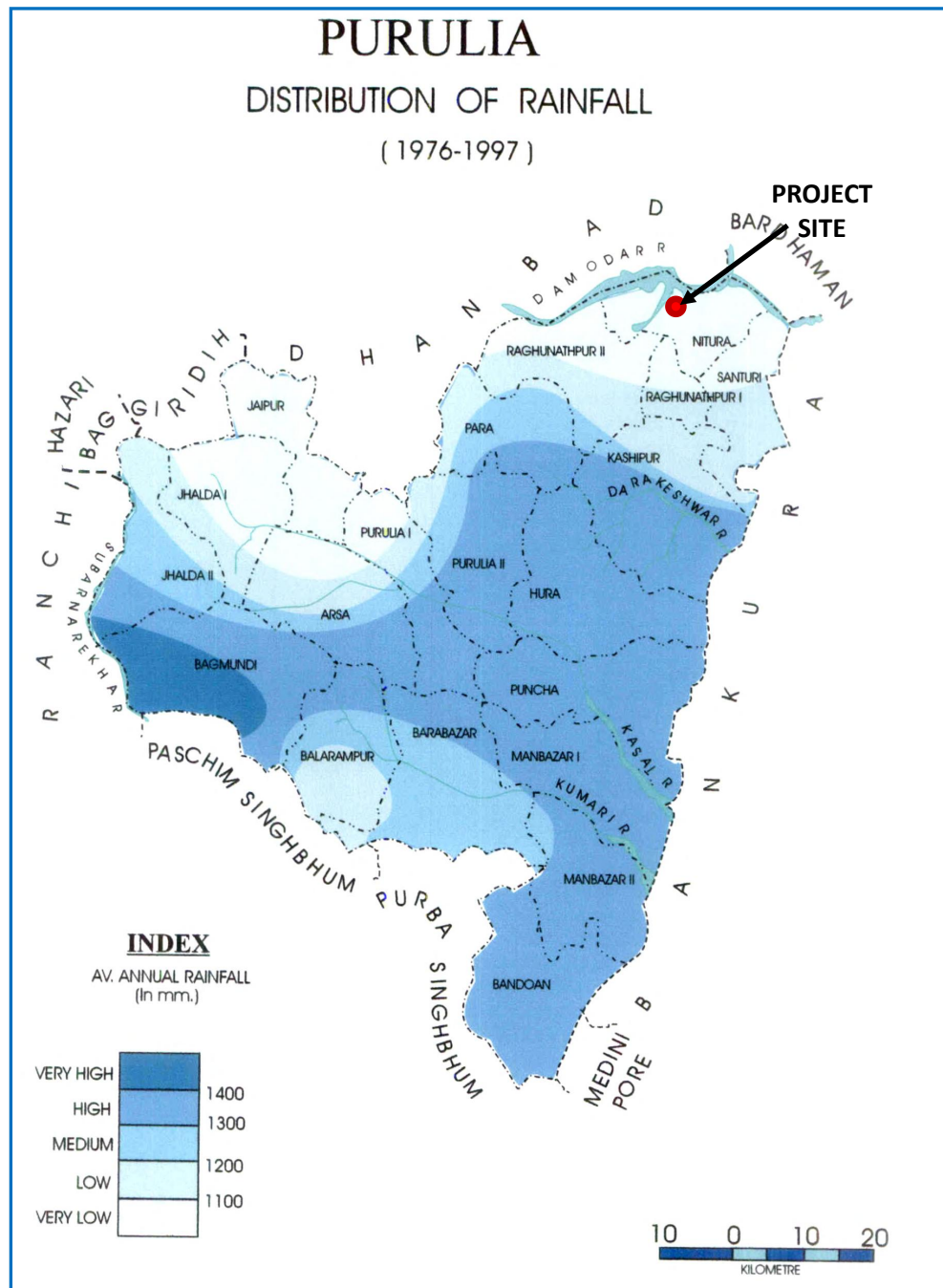


FIGURE-3.2.3.1
DISTRIBUTION OF RAINFALL IN PURULIA DISTRICT

3.3 SEISMICITY

As per seismic hazard zonation map, West Bengal experiences earthquakes at a relatively lower frequency. According to the IMD catalogue regions are divided in the seismic zones II to V (low damage to very high damage), corresponding to PEAK GROUND ACCELERATION (PGA) of 0.1, 0.2 and 0.25 ($1\text{ g} = 980\text{ Gal}$) respectively.

According to IS:1893-1984, the Project Site falls under Zone-III. It means that the earthquake shock in the area is minor. There is no major earthquake episode recorded in the study area till date. Seismic Zoning Map of India with mentioning of the project site has been presented in **Figure-3.3.1**.

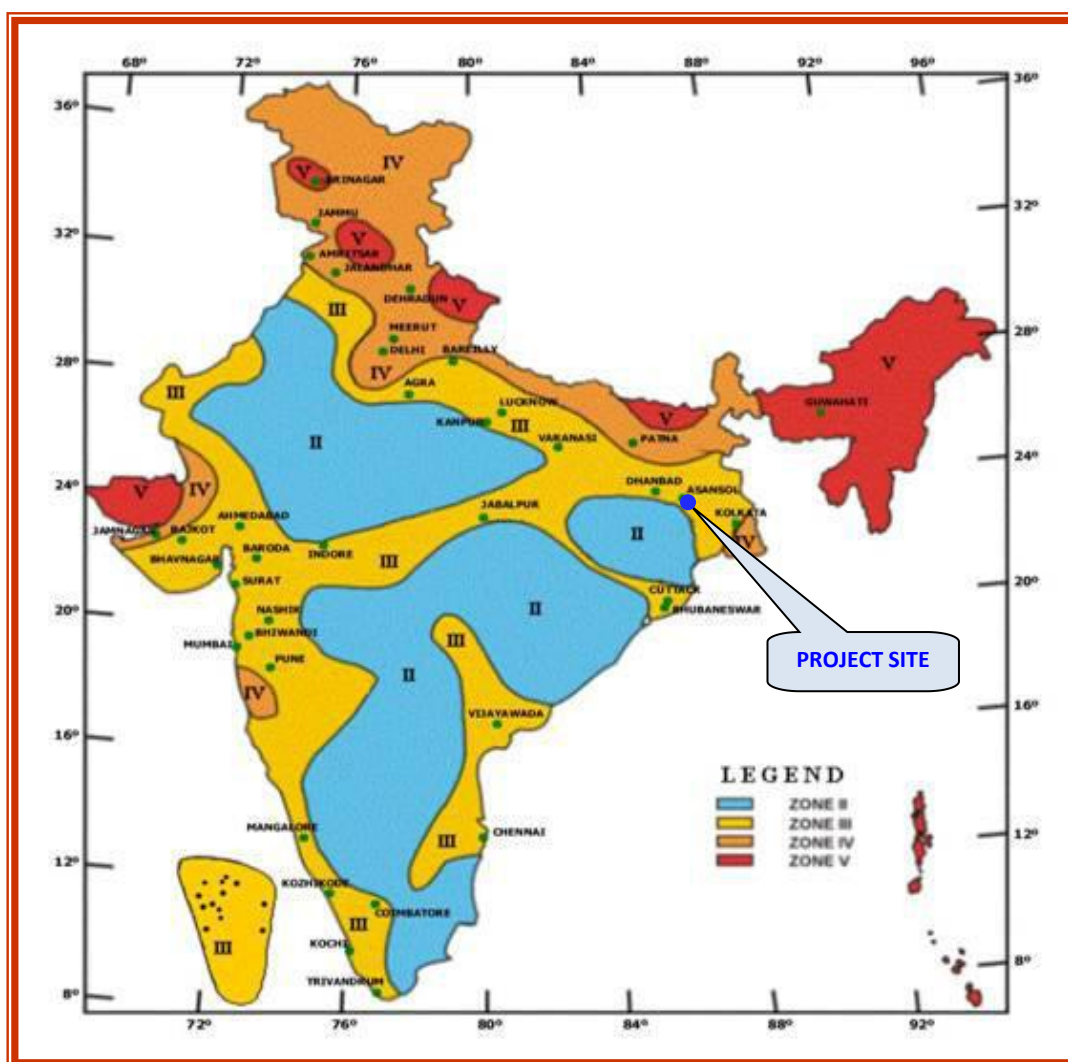


FIGURE-3.3.1

SEISMIC ZONING MAP OF INDIA INDICATING THE STUDY

3.4 MAJOR INDUSTRIES WITHIN 10 KM RADIUS STUDY AREA

Mainly steel and power industries are found within 10 Km radius study area but there very few industries also found within the study area. Here, the name of industries which falling within 10 km radius study area around the project site, have been given in the below mentioned table.

SL. NO.	NAME OF INDUSTRIES
1	Shakambhari Ispat & Power Ltd.
2	BRGD Sponge & Iron Pvt. Ltd.
3	Apodictic Ceramics (P) Ltd.
4	Joy Ma Durga Hard Coke & Ceramics
5	Limtex Steels Ltd.
6	Ispat Damodar Ltd.
7	MCCPL Coke Oven Plant
8	TRF Limited
9	Ekta Enterprises
10	Sobha Hard Coke Pvt. Ltd.
11	Shivcharan Industries
12	McNally Bharat Engineering Co. Ltd.

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3.5 LAND USE

The proposed installation of **M/s AIC Iron Industries Pvt. Ltd.** is located at village - Benipur, P.O. - Saltor, P.S. - Neturia, Dist. - Purulia in West Bengal. The proposed project site and 10 kilometer radius area around the project site encompassing a total area of 31425 ha comes under the Purulia & Paschim Bardhaman Districts in West Bengal. The Geographical Co-ordinates of the Project Site are Latitude: 23°39'21.74"N to 23°39'43.56"N and Longitude: 86°47'39.81"E to 86°48'19.26"E with Elevation is about 160 m (524 ft) Above Mean Sea Level (AMSL). Damodar River, the only major river flows from west to east in the northern part of the study area.

3.5.1 LAND USE BASED ON GIS

The sensitivity of the environment i.e existing landuse is studied through Geographical Information System (GIS). Geographic Information System (GIS) is a scientific technique, which has revolutionized the way that land is inventoried, managed, planned and studied. GIS provides the theories and methods for organization and analysis of original measurements of location, secondary spatial data and topography.

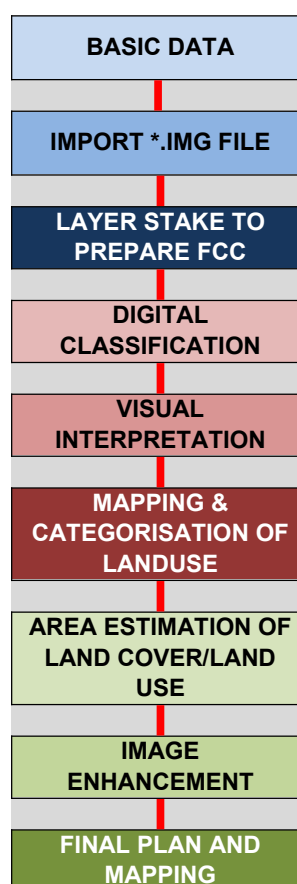
As an information system GIS provides the theories and methods for organization, storage, analysis, modeling, mapping and display of physical and biological data, as well as the distribution of cultural or socio-economic data. GIS applications are diverse. They include determining the suitability of land for different uses, planning future land uses for different objectives, analyzing land and land-cover properties for both resource inventories and scientific studies, and sitting of developmental activities. The section below describes the methodology for mapping and plan preparation techniques.

3.5.2 DATA SOURCE & ANALYSIS

Remote Sensing Data: To study and map the land use pattern of the area, with extension latitude 23°39'42"N and longitude 86°47'59"E has been used as input data. The spatial resolution of the satellite data is 30m. The bands used as input data for the current study have following features:

- **Band 2: 0.52 - 0.59 μ m (green):** This band corresponds to the green reflectance of healthy vegetation and is spanning the region between the blue and red chlorophyll absorption bands.

- **Band 3: 0.62 - 0.68 μm (red):** This red chlorophyll absorption band of healthy green vegetation is one of the most important bands for vegetation discrimination. In addition, it is useful for soil-boundary and geological boundary mapping. Band 3 may exhibit more contrast than bands 1 and 2 because the effect of the atmosphere is reduced. The 0.69 m cut-off represents the beginning of a spectral region from 0.68 to 0.75 m where vegetation reflectance crossovers occur that can reduce the accuracy of vegetation studies.
- **Band 4: 0.77 - 0.86 μm (near infrared):** For reasons discussed above, the lower cut-off for this band was placed above 0.75 m. This band is particularly responsive to the amount of vegetation biomass present in a scene. It is useful for identification of vegetation types, and emphasizes on soil-crop and land-water contrasts.



3.5.3 Other Secondary Data

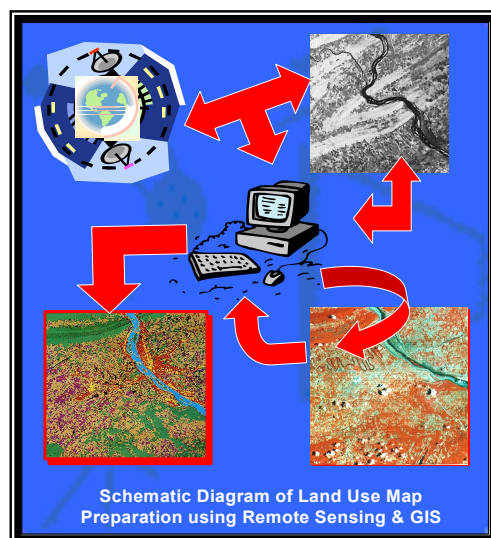
The secondary database considered for validation and geo-referencing of the image is as follows: *Topographical map in 1 inch: 1 mile of Survey of India: 73 M/1 and M/2 District Planning Series Map, NATMO, 1998*

Step - I	Layer stacking of three distinct file into a single file and create FCC
Step - II	Select an appropriate band used throughout the analysis. An examination of the three bands shows that the one visible band (2) provides less evidence of the various water surfaces across the image. Band 4, the near infrared band, clearly separates water bodies from other surfaces. Band 3 help to distinguish vegetation cover.
Step - III	Digital classification: Un-supervised ISO data classification carried out considering green, red, NIR bands with 5 iteration and expected number of classes 50.
Step - IV	Aggregation of classes obtain through this classification session into classes having significance on the physical world was then carried out based on DN value.
Step - V	Visual interpretation is also done since digital classification only consider pixel values not the geographic location, association, shape, etc.
Step -VI	Area Calculation of each Land Use/Land Cover Classes
Step- VII	Comparison with some reference data and sample ground validation
Step - VIII	Final Map and Report

3.5.4 Digital Image Processing:

The digital image processing includes image rectification; image enhancement; visual interpretation and land use mapping. The processes are explained below:

- **Image Rectification:** The satellite images are given in BSQ (Band Sequential) format. These are imported to Erdas environment. Then geometric correction applied to the images to correct the distorted image data to create a more faithful representation of original scene. Image rectification procedures are often termed 'pre-processing' operations because they



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normally precede further manipulation and analysis of the image data to extract specific information.

The satellite images are given in BSQ (Band Sequential) format. These are imported to Erdas environment. Then geometric correction applied to the images to correct the distorted image data to create a more faithful representation of original scene. Image rectification procedures are often termed 'pre-processing' operations because they normally precede further manipulation and analysis of the image data to extract specific information.

- **Image Enhancement:** This procedure is applied to the images in order to more effectively display or record the data for subsequent visual interpretation. High pass filter used to visualize more correctly the linear features such as, roads, rail, canal, river etc. Histogram Equalization was used to distinguished area of the same tone.
- **Visual Interpretation and Land use Mapping:** Satellite imagery contains detail records of features on the ground at the time of satellite overpass. An image interpreter systematically examines the images for generating the information required by him. Other supporting materials such as published maps and reports from various sources will increase the accuracy of the interpretation. The chain of process in visual interpretation of the shape and pattern in an image begins with detection. There are certain fundamental characteristics seen on images which aid in the visual interpretation of satellite imagery. These are tone/ color, size, shape, texture, pattern, location, association, resolution and season. Visual interpretation is subjective and differs from person to person and also upon the season, scale, spectral bands, spatial resolution, overall image contrast & quality of the data.

The procedure for mapping for land use from satellite imagery of different season & on different scale is well established. Several parameters like terrain, climatic conditions, socio-economic trends, and environmental influences etc. play a vital role in the existence of various land use categories.

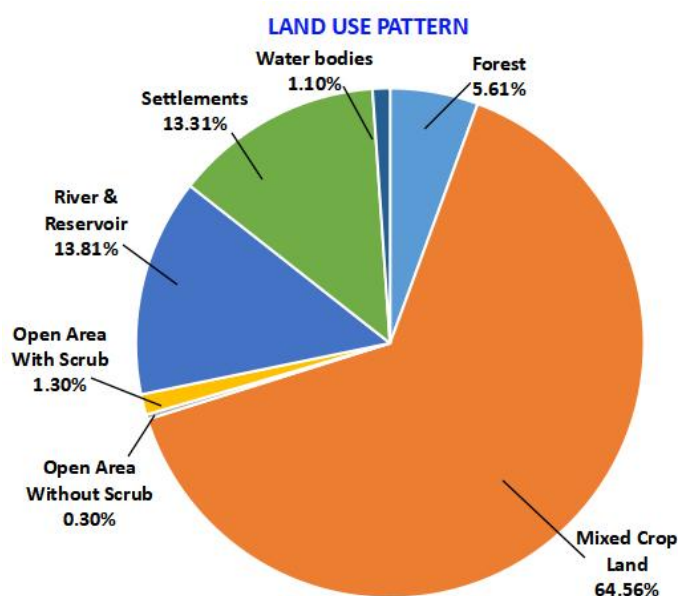
3.5.5 Land use and Land cover Pattern:

The developmental projects will not only affect the environment of Project site, it may also have an impact on the receiving environment of the surrounding area within 10 km. In the proposed project of Environmental Impact Assessment Study, the Landuse/ Landcover study has been done within 10 km radius area which is called Study Area. The Project Site is situated in Benipur in Purulia District of West Bengal. The site is well linked with roads and railways. The Damodar River is about 3 km away in the north of the proposed site. The study area is characterized by undulating lands.

Areawise Landuse and Landcover type		
Class Name	Area in sq km	Percentage
Forest	17.6	5.6
Mixed Crop Land	202.8	64.5
Open Area Without Scrub	1.1	0.3
Open Area With Scrub	4.1	1.3
River & Reservoir	43.3	13.8
Settlements	41.9	13.3
Water bodies	3.5	1.1
Total Area	314.3	100.0

The topography of the Study Area does not show much variation in the land use / land cover pattern.

The Damodar River is about 2.4 Kms away in the south of the proposed site. The study area is characterized by undulating lands. The topography of the Study Area does not show much variation in the land use / land cover pattern.



The region is mostly covered by agricultural land with settlements and patches of green vegetations either planted by local inhabitants or are the natural vegetations within the study area. The land use / land cover pattern of the Study Area have been framed from the Satellite Imagery and Toposheet and authenticated by field visit. The land use / land cover pattern of the Study Area, may be divided into following 9 categories: (i) Forest (ii) Mixed Crop Land (iii) Open areas without scrub/ sandy areas (iv) Open area with scrubs (v) River and reservoirs (vi) Settlements (vii) Water bodies. The above categories of land use and land cover pattern cover an area of about 314 km². The percentage of land area covered in figures is mentioned in the Table and has been illustrated through the pie diagram. The area under different land use/ land cover of Study Area is presented in the following Land use and Land cover Map. The category wise land utilization pattern is described below:

- Forest and Dense Vegetation:** The category of forest land and dense vegetations in the study area consists mostly of open mixed jungle and dense vegetation on open lands or along roadside. As it is interpreted from the satellite imagery, the dense vegetation in the area also consists of the vegetations by plantations, social forestry and orchards in the area. Mostly open mixed jungle or the dense vegetations have been observed surrounding the settlements. The trees are of average height and important trees are mango, banyan, banana, jackfruits, sal, mahua etc. The total forest area covers only about 17.6 km² which is 5.6 % of the total land area.
- Settlements:** Settlements in the study area refer to the towns as well as village settlements with all infrastructural facilities like roads, railways, markets etc. It also covers the industrially built-up areas. The study area is densely populated area with many settlements spread along the main roads and railways and along the National Highway, NH-2 also called The Grand Trunk Road.

Settlements cover mostly 41.90 km² of land area which is 13.3% of the total 10km study area. Some village settlements are Gusaidanga, Rampur, Radhamadhabpur, Ganggutiya, Sonari, Chumgari, Babuldih, Desongarh etc.

- Open Area:** Open area covers the maximum land in the Study area. It is a category of wasteland. These are open barren land which is not suitable for agriculture. These lands have badland topography i.e. soil nutrients are lost either by erosion or frequent use by human beings.

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The lands are generally devoid of any green vegetation. Open area can be considered as land cover as well as land use.

Sometimes the vegetation on the patches of lands is cleared due to frequent use for agriculture and other purposes. Because of multipurpose use these kinds of lands have lost the fertility and remain barren without any vegetation. Such kind of open areas fall in the category of landuse. Sometimes due to presence of gravels and rocks or simply sands, open areas are formed which are devoid of any vegetation. Such kind of open areas fall in the category of landcover. In the study area the sandbars formed along the banks of Damodar River also comes in the category of open area. These sandbars are formed in the summer season when the water is dried up and depositions occur along the river banks.

The Study Area has 1.1 km² of land under the category of open area which is 0.3% of total land use and land cover. Open area excluding the sand bars cover the entire study area in patches.

- **Land with Scrub:** The land with scrubs covers about 4.1 km² i.e., 1.3% of total land area. This kind of land cover refers to the land area where the natural vegetation consists of bushes and scrubs/shrubs and very little growth of grasses. The soil of this type of land area with very few unwanted vegetation is unsuitable for agricultural purposes and is classified in the wasteland category. Only small thorny bushes and grasses are sustained in this soil. Generally this type of land cover may be observed to be spread within the agricultural land of any area. In the proposed study area also, this type of land cover is spread throughout the study area along with the open areas.
- **Water Bodies:** Water bodies refer to the small water reservoirs like ponds, lakes, tanks etc. Water bodies cover only 3.5 km² of land area which is 1.1% of total land use.
- **River:** River Damodar is located in the extreme north-northeastern part of the Project Site at about 4-5 km away. This River is flowing from north to northeast direction in the study area. The River covers about 43.3 km² of land of the study area which is 13.8% of the total land area. The land use pattern is shown in **Figure-3.5.1**.

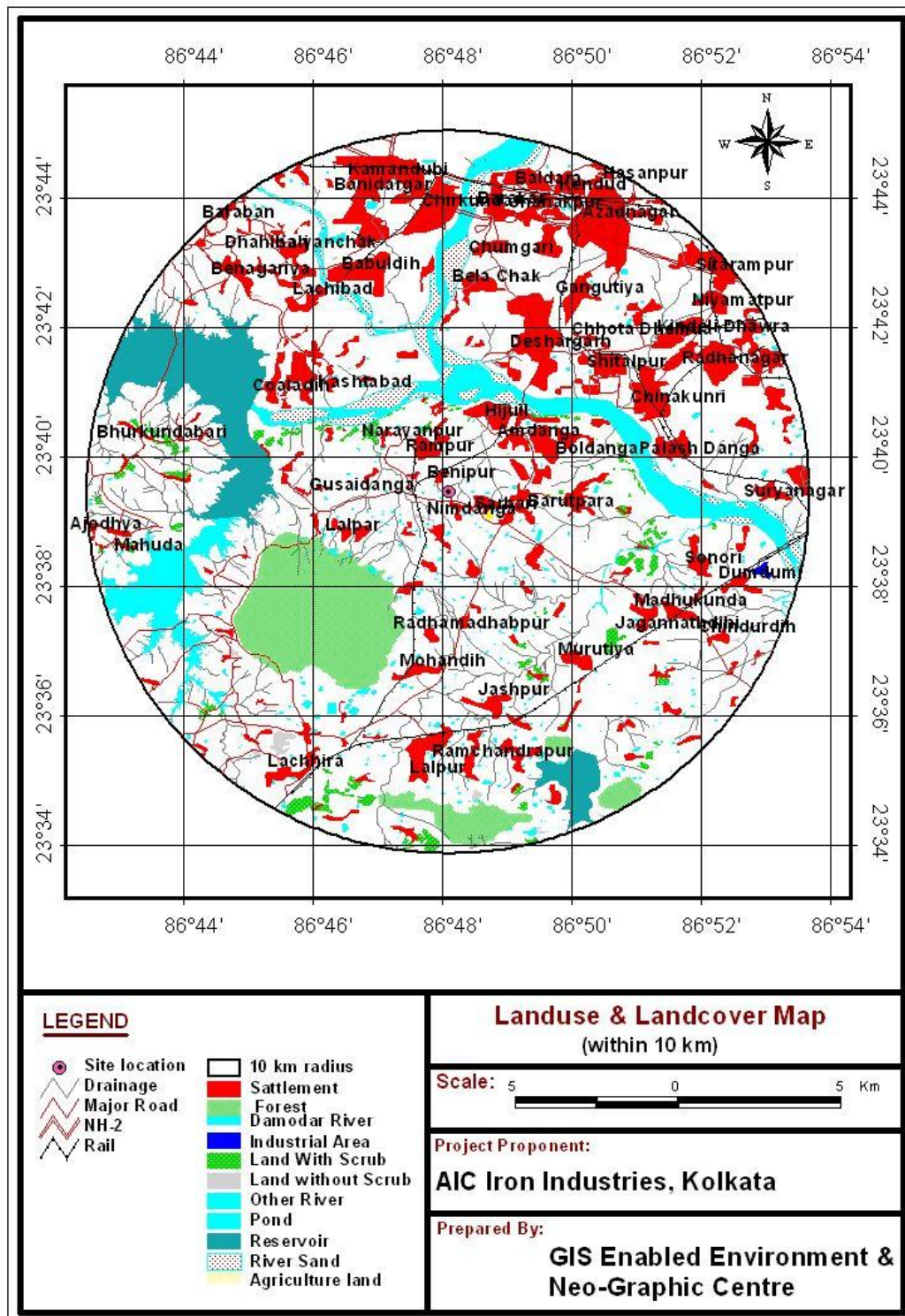


FIGURE-3.5.1
LULC MAP OF THE STUDY AREA

3.6 SOIL

Soil may be defined as a thin layer of earth's crust that serves as a natural medium for the growth of plants. It is the unconsolidated mineral matter which has been subjected to and influenced by the genetic and the environmental factors like parent materials, climate, organisms and physico-chemical action of wind, water and sunlight over a period of time. Soil differs from the parent materials in the morphological, physical, chemical and biological properties. Also soil differs among themselves in some or all the genetic or environmental factors, therefore, some soils are yellow, some are black, some are reddish, some are coarse textured. They serve as a reservoir of nutrients for plants and crop and also provide mechanical anchorage and favorable tilth.

3.6.1 FIELD STUDY, SAMPLING & ANALYSIS

To assess the impacts of the proposed projects activities on the soils in the study area, the physico-chemical characteristics of soils within the study area have been examined by obtaining soil samples from selected points and analysis of the same samples.

Four (4) sampling stations were selected for studying soil characteristics, which has been shown in **Table-3.6.1** and these locations have been pictorially presented in **Figure-3.6.1**. Stations have been spread over the study area, keeping in view the vegetative cover, soil types and maximum deposition of pollutants emitted through stacks, which would accord an overall idea of the soil characteristics within the study area.

The samples were collected once in the study period. A number of parameters were determined which are indicative of physical, chemical and fertility characteristics. The physico-chemical characteristics of the soils in the study area, as obtained from the analysis of the soil samples, are presented in **Table-3.6.2**.

TABLE-3.6.1
NAME & CO-ORDINATES OF SAMPLING LOCATIONS

SAMPLE CODE	LOCATION NAME	LATITUDE	LONGITUDE
SQ-1	Near Project Site	23°39'34.78"N	86°47'24.99"E
SQ-2	Kuchahela	23°39'51.16"N	86°48'13.92"E
SQ-3	Tiltoriya	23°38'44.04"N	86°47'6.90"E
SQ-4	Keliyasota	23°40'15.61"N	86°46'4.43"E

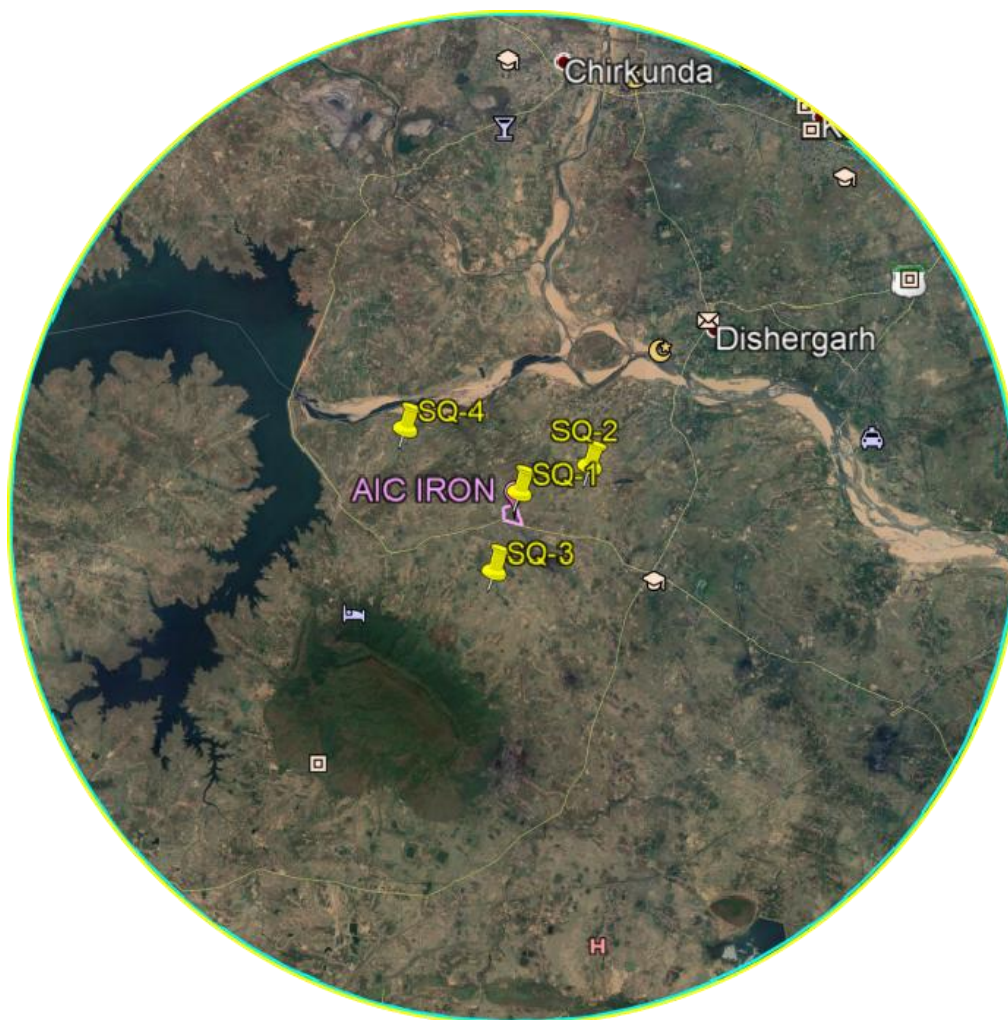


Figure-3.6.1
Soil Sampling Locations in the study

3.6.2 CHARACTERISTICS OF SOIL IN THE STUDY AREA

Soil erodibility i.e. the response of a soil to the erosion process is complex and is largely influenced by soil properties such as texture, structural stability, organic matter content and permeability. Generally sandy soils have lower runoff rates, and are more easily detached, but less easily transported than silt soils. Clay soils are not easily detached, but lower infiltration rates may lead to greater run-off and increased erosion. Silt soils tend to have the greatest erodibilities since particles are easily detached and transported. Organic matter has considerable binding effect on soil particles. Therefore it helps in the formation of soil aggregates i.e. soil structure. This formation of soil structure makes the soil less vulnerable to erosion.

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The soil type in the study area is basically “Shallow imperfectly drained sandy loam soil”. This type of soil is found on very gently sloping to undulating plains with gravelly loamy surface and moderate erosion in the Raghunathpur block. The main soil texture in the study area is sandy loam.

3.6.2.1 Physical Characteristics

The physical properties examined include colour, texture, bulk density, and water holding capacity. Colour of soils was observed generally as Brownish. It is well documented that soils ranging between Brownish to Reddish are generally acidic with low in nitrogen, calcium, phosphate and other plant nutrients. The main physical property of these 4 types of soil is ranged between loamy to sandy loam soil.

Soils having larger particles usually have higher bulk density than those of smaller particles. Bulk density of soils in the study area varied between (1.18-1.42) gm/cm³ which is normal for such soils. Water holding capacity of the soils varied between (36.4 - 38.2)%.

3.6.2.2 Chemical Characteristics

The soils were slightly acidic with pH range (6.7-7.2). CEC was found varying between (24.6-25.8) meq/100 gm. In soil samples, calcium content of the soils varied between (310 - 430) mg/kg. Range of sodium in the soils varied between (133-150) mg/kg. In soils, sodium generally occurs as NaCl, Na₂SO₄ and sometimes, as Na₂CO₃ and other soluble salts. In comparison to sodium, potassium levels were slightly low. Range of potassium varied between (116-133) mg/kg. In this study available Nitrogen level varied between (126-149) mg/kg. Most of the nitrogen is available in form of nitrates, nitrites, NH₄⁺ and organic nitrogen. Available Phosphorous content ranged between (0.14 - 0.21)%. Ranges of Magnesium in the soil was varied between (276-328) mg/kg and Organic Matter was observed between (2.2-3.1)%.

3.6.2.3 Fertility Status of Soil

The observed level of pH (6.7-7.2) is not expected to hinder the growth of agricultural crops. Soils were observed to possess appreciable level of Potassium, nitrogen, and phosphorous which indicate moderate to good fertility or agricultural potential of the soils. The levels of other elements were appreciably good. Thus, the overall fertility status of the soils within the study area is reasonably good and is not expected to be detrimental to the growth of agricultural and forest crops.

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The prevailing edaphic, hydrological and climatological conditions favour production of paddy and quite a good number of other crops. The prime agricultural crop paddy is grown during both of the kharif and rabi seasons.

Conclusion:

Alluvial and clay texture of the soil of this area along with sufficient level of organic matter renders moderate to high productivity of agricultural crops.

The soil samples collected from the study area reveal that the soil mostly has clay structure with good water holding capacity (36.4-38.2)%, high porosity (33.6-34.5)% and is rich in minerals and organic matter having pH (6.7-7.2) which favours plant growth. Water holding capacity and CEC of the soil are found to be synergistic in supporting the normal growth of the plant. Organic matter provides the nutrient and water for most of the terrestrial vegetation and is helpful for agriculture, plant growth, etc. As per FAO-UNESCO soil classification, this soil is of Ultisols and is suitable for paddy rice, sesame, ground nut, chillies, mango, rose etc. It is also home for beneficial organisms, worms etc. which, in turn, help in plant growth. The nutrients and soil structure increases the sustainability of top soil and as such, no impact from the local industries have been observed.

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TABLE-3.6.2
SOIL QUALITY IN THE STUDY AREA

SL. NO.	PARAMETERS	UNIT	SAMPLING LOCATIONS			
			SQ-1	SQ-2	SQ-3	SQ-4
PHYSICAL CHARACTERESTICS						
1	COLOUR	-	Redish Brown Clay	Brown	Redish Brown Clay	Brown
2	TEXTURE	-	Clay Loam	Clay Loam	Clay Loam	Clay Loam
a)	Sand	%	42	47	49	45
b)	Silt	%	24	22	23	22
c)	Clay	%	34	31	28	33
3	BULK DENSITY	gm/cm ³	1.18	1.36	1.42	1.25
4	POROSITY	%	34.5	33.9	33.6	34.1
5	WATER HOLDING CAPACITY	%	38.2	37.3	36.4	37.5
CHEMICAL CHARACTERESTICS						
1	pH	-	6.9	7.2	6.7	7.1
2	EC	μmhos/cm	628	529	653	568
3	Calcium (as Ca)	mg/kg	430	381	310	391
4	Magnessium (as Mg)	mg/kg	307	295	328	276
5	Sodium (as Na)	mg/kg	150	146	141	133
6	Potasium (as K)	mg/kg	122	133	116	133
7	Sulphur (as S)	mg/kg	42.1	33.6	39.2	31.5
8	Nitrogen (as N)	mg/kg	143	149	144	126
9	Phosphorous (as P)	mg/kg	27.3	25.6	27.4	25.9
10	CEC	meq/ 100 g	25.8	25.1	24.6	25.5
11	Organic Matter	%	2.8	3.1	2.4	2.2
12	Copper (as Cu)	mg/kg	10.7	14	10.4	15
13	Chromium (as Cr)	mg/kg	19.9	21.4	14.4	13.4
14	Zinc (as Zn)	mg/kg	10.8	14.5	12.9	11.6
15	Lead (as Pb)	mg/kg	5.9	3.7	3.5	5.5
16	SAR	-	1.4	1.4	1.3	1.3

SAMPLE CODE	LOCATION NAME
SQ 1	Near Project Site
SQ 2	Kuchahela
SQ 3	Tiltoriya
SQ 4	Keliasota

3.7 METEOROLOGY

3.7.1 SEASONS

The climate of the project area is humid and tropical. It is characterised by a hot and dry summer from March to May, a south-west monsoon or rainy season from June to September, a pleasant post-monsoon or retreating monsoon from October to November and a cool winter from December to February. Therefore, climatologically, four seasons viz. summer (pre-monsoon), monsoon, post-monsoon and winter could be deciphered comprising the following months:

Summer	:	March, April, May
Monsoon	:	June, July, August, and September
Post-monsoon	:	October, November
Winter	:	December, January, and February

3.7.2 PAST RECORDS OF IMD, PURULIA

3.7.2.1 Data Collected

The meteorological data described in this section have been collected from the IMD Station located at Purulia and deemed to be representative of the study area. The station is observed to be well manned and equipped. Available meteorological data for the past 30 years' period (1971-2000) have been collected and have been summarized. The climatic features of this station are presented in **Tables 3.7.1**.

3.7.2.2 Temperature

At Purulia, the daily mean maximum temperature for the past 30 years' period (1971 – 2000) was recorded from 38.5°C (May) to 24.9°C (January) and daily mean minimum temperature for the past 30 years' period (1971 – 2000) was recorded from 25.5°C (June) to 11.7°C (January) (**Table-3.7.1**).

3.7.2.3 Relative Humidity

Humidity was fairly high through the major part of the year at Purulia. In day time the overall annual mean relative humidity was 71% while in night time it was 59% for the past 30 years' period (1971 – 2000) (**Table-3.7.1**). The mean relative humidity of Monsoon and Post monsoon seasons was ranging between 86% - 70% in day time and 80% - 61% in night time for the past 30 years' period (1971 – 2000). The mean relative humidity of summer and winter seasons was ranging between 71% - 55% in day time and 59% - 38% in night time. From these 30 years' IMD data it was found that the relative humidity was fairly very high in Monsoon season (June, July, August, and September).

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3.7.2.4 Atmospheric Pressure

The overall annual mean atmospheric pressures was recorded 736 mmHg in day time and 733 mmHg in night time (**Table 3.7.1**). Day Time mean maximum atmospheric pressures was recorded 742 mmHg (December) and night Time mean maximum atmospheric pressures was recorded 729 mmHg (June). Day Time mean minimum atmospheric pressures was recorded 739 mmHg (December) and night Time mean minimum atmospheric pressures was recorded 727 mmHg (June).

3.7.2.5 Rainfall and Rainy Days

The total annual mean rainfall received is about 1418.2 mm at Purulia for the past 30 years' period (1971 – 2000) (**Table-3.7.1**). Rainfall was peaked during the month of August (mean monthly rainfall in August was 306.3 mm). The lowest rainfall was occurred during the month of December (mean monthly rainfall in December was 11.4 mm). Total annual mean number of rainy days was about 75 at Purulia for the past 30 years' period (1971 – 2000).

3.7.2.6 Wind Speed and Direction

The annual mean wind speed is around 3.4 km/hr at Purulia with the mean monthly wind speed was ranged between 1.8 km/hr (during November) and 5.2 km/hr (during June) (**Table-3.7.1**). The predominant wind direction was observed South.

3.7.3 ON-SITE METEOROLOGICAL OBSERVATIONS

Air Pollutants upon discharge to atmosphere pass through a number of mechanisms, which include diffusion and transportation leading to dispersion. These mechanisms are governed by the local atmospheric conditions. All these result in the necessity to collect the meteorological parameters like ambient temperature, wind speed, wind direction, and other weather conditions (relative humidity, atmospheric pressure etc.), which will be ultimately used for the prediction of the ground level concentrations of the air pollutants through mathematical modelling.

For this purpose as also to corroborate and supplement the long term meteorological data availed from IMD, Purulia, a sophisticated on-site meteorological observatory was established close to the project site and operated continuously in winter season for the monitoring period of **1st March, 2023 – 31st May, 2023**.

The observatory was located about 10 m above the ground level and ensured to be free from any obstruction to wind. Besides, this location was found to be most suitable one being close to the project site. The summary of the on-site data generated in respect of the above

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parameters for the period mentioned above are presented in **Table-3.7.2**. The Wind rose diagram for the entire period is shown in **Figures-3.7.1**.

3.7.4 RESULTS OF ON-SITE METEOROLOGICAL DATA

3.7.4.1 Temperature

The monthly maximum and minimum temperatures recorded on-site during the aforesaid monitoring period (**1st March, 2023 – 31st May, 2023**) varied between (32.0 - 44.5)°C and (22.5 - 25.5)°C respectively with overall maximum and minimum temperatures being 44.5°C and 22.5°C respectively (**Table-3.7.2**).

3.7.4.2 Relative Humidity

The monthly maximum and minimum relative humidity recorded on-site during the said monitoring period varied between (68-73)% and (47-56)% respectively, the overall maximum and minimum being 73% and 47% respectively (**Table 3.7.2**).

3.7.4.3 Atmospheric Pressure

The overall maximum and minimum atmospheric pressures recorded on-site during the said monitoring period were 755.7 mmHg and 749.2 mmHg respectively (**Table 3.7.2**).

3.7.4.4 Wind Speed and Direction

The maximum wind speed 6.51 Km/hr was observed in the month of May while the overall mean wind speed during the whole monitoring period was observed 5.82 Km/hr. (**Table 3.7.2**). The predominant wind direction was observed at south-west direction.

3.7.5 Comparison of Primary data and IMD Data

It could be observed that, the pattern of Temperature, Relative Humidity, Atmospheric Pressure, Wind Speed & Direction data recorded on-site near the project site for the monitoring period of March, 2023 - May, 2023 generally matches with the past 30 years (1971-2000) data of IMD, Purulia.

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Table 3.7.1

Monthly Summary of Climatological Data Collected from IMD, Purulia (1971-2000)

स्टेशन : पुरुलिया STATION : Purulia		अक्षांश LAT. 23°20'		देशांतर LONG. 86°25'		समुद्री तल माध्य से ऊंचाई HEIGHT ABOVE M.S.L. 255		मीटर METRES		प्रक्षणों पर आधारित BASED ON OBSERVATIONS 1971-2000												
माह	स्टेशन का सतह दाब	वायु तापमान						चरम		आर्द्रता		मेघ की मात्रा		मासिक योग	वर्षा के दिनोंकी संख्या	वर्षसहित सबसे नम महीने का योग	वर्षसहित शुष्कतम महीने का योग	24 घंटीकी सबसे भारी वर्षा	दिनांक और वर्ष	माध्य पवन गति		
		माध्य				चरम		दिनांक और वर्ष		दिनांक और वर्ष												
		शुष्क बल्ब	नम बल्ब	दैनिक अधिकतम	दैनिक न्यूनतम	माह में उच्चतम	माह में निम्नतम	उच्चतम	निम्नतम	सापेक्ष आर्द्रता	वाष्प दाब	समस्त मेघ	निम्न मेघ									
MONTH	STATION LEVEL PRESSURE	AIR TEMPERATURE										HUMIDITY		CLOUD AMOUNTS		RAINFALL					MEAN WIND SPEED	
		MEAN						EXTREMES				RELATIVE HUMIDITY		ALL CLOUDS		MONTHLY TOTAL	NO. OF RAINY DAYS	TOTAL IN WETTEST MONTH WITH YEAR	TOTAL IN DRIEST MONTH WITH YEAR	HEAVIEST FALL IN 24 HOURS		DATE AND YEAR
		DRY BULB	WET BULB	DAILY MAX	DAILY MIN	HIGHEST IN THE MONTH	LOWEST IN THE MONTH	HIGHEST	DATE AND YEAR	LOWEST	DATE AND YEAR	RELATIVE HUMIDITY	VAPOUR PRESSURE	ALL CLOUDS	LOW CLOUDS							
		एच.पी.ए hPa	डि. से °C	डि. से °C	डि. से °C	डि. से °C	डि. से °C	डि. से °C	डि. से °C	प्रतिशत %	एच.पी.ए hPa	आकाश के अष्टमांश Oktas of sky	मि.मि. mm		मि.मि. mm	मि.मि. mm	मि.मि. mm	मि.मि. mm	कि.मी. प्र. घं. Kmph			
जनवरी JAN	I II	988.4 985.0	15.8 22.3	13.0 16.8	24.9 11.7	28.9	8.0	33.4	1 1977	3.8	13 1989	71 55	12.8 14.9	1.5 1.8	1.1 1.1	13.3	1.3	50.8 1971	0.0	45.6	21 1998	1.9
फरवरी FEB	I II	986.5 982.6	18.9 25.9	15.0 18.5	27.9 14.4	33.0	10.1	37.3	22 1967	6.3	20 1989	64 46	14.2 15.4	1.7 1.9	1.3 1.5	24.8	2.1	106.4 1981	0.0	62.2	2 1979	2.6
मार्च MAR	I II	983.7 979.4	24.4 31.2	18.6 21.4	33.4 19.2	38.4	14.4	41.7	31 1955	10.7	4 1987	55 40	16.9 17.6	1.5 2.2	1.0 1.6	25.0	2.0	85.0 1988	0.0	77.0	30 1998	3.3
अप्रैल APR	I II	980.0 975.5	29.1 34.8	22.4 23.6	37.8 23.6	41.8	19.3	46.0	29 1999	13.5	2 1965	55 38	21.9 20.1	1.8 3.0	1.2 2.6	40.8	2.9	209.8 1993	0.0	60.0	25 1976	4.2
मई MAY	I II	976.5 972.3	30.5 34.9	24.9 25.2	38.5 25.3	43.4	21.0	46.3	20 1972	15.6	3 1987	63 47	27.2 24.4	2.4 4.0	1.8 3.4	69.6	4.8	162.0 1977	4.3 1957	66.4	27 1989	5.0
जून JUN	I II	972.5 969.4	29.6 31.6	25.9 26.1	35.6 25.5	41.8	22.0	46.2	10 1966	18.3	12 1988	74 66	30.4 29.4	4.7 6.2	3.8 5.2	249.0	12.0	842.0 1984	43.4 1987	147.6	23 1996	5.2
जुलाई JUL	I II	972.6 969.9	27.8 29.1	25.7 26.1	32.2 24.8	35.9	22.4	40.7	6 1982	17.8	14 1953	84 78	31.3 31.5	6.5 7.0	5.6 6.1	302.6	16.0	573.6 1987	106.3 1972	148.3	6 1951	4.3
अगस्त AUG	I II	973.9 970.9	27.3 28.9	25.6 26.1	31.6 24.6	34.4	22.7	37.8	3 1972	17.2	27 1953	86 80	31.3 31.7	6.4 6.9	5.7 5.8	306.3	15.8	520.0 1967	196.4 1999	150.8	28 1972	4.2
सितम्बर SEP	I II	978.2 974.9	27.3 28.7	25.1 25.6	31.7 24.0	34.7	21.9	39.0	28 1981	17.0	27 1986	83 77	30.3 30.3	5.0 6.1	4.3 5.1	268.3	12.1	773.6 1978	52.4 1968	181.6	15 1958	3.4
अक्टूबर OCT	I II	983.4 979.9	25.6 28.2	22.7 23.7	31.4 21.4	34.1	17.6	39.4	1 1974	13.2	22 1986	77 67	25.3 25.7	2.5 3.4	2.1 2.5	87.2	4.2	260.4 1999	0.0	190.6	19 1999	2.2
नवम्बर NOV	I II	987.0 983.6	21.5 25.3	18.1 20.2	28.9 16.9	31.7	13.1	35.1	5 1981	7.7	29 1985	70 61	18.3 19.8	1.7 2.0	1.2 1.4	19.9	1.1	135.0 1995	0.0	97.0	10 1995	1.8
दिसम्बर DEC	I II	989.2 985.7	16.9 22.0	14.0 17.2	25.5 12.6	28.5	9.4	33.3	1 1955	5.7	26 1961	70 59	13.7 15.8	1.4 1.6	0.7 0.8	11.4	0.8	88.0 1991	0.0	49.6	23 1991	1.9
वार्षिक योग या माध्य ANNUAL TOTAL OR MEAN	I II	981.0 977.5	24.5 28.5	20.8 22.5	31.6 20.3	43.5	7.9	46.3	20 5	3.8 1972	13 1	71 59	22.7 23.0	3.1 3.8	2.5 3.1	1418.2	75.0	2138.8 1978	927.6 1957	190.6 10	19 1999	3.4
वर्षों की सं NUMBER OF YEARS	I II	30	30	30	30	29	30	29	72	72		30	30	30	30	28	28	50	50	51		26

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Table 3.7.1 (Contd...)
Monthly Summary of Climatological Data Collected from IMD, Purulia (1971-2000)

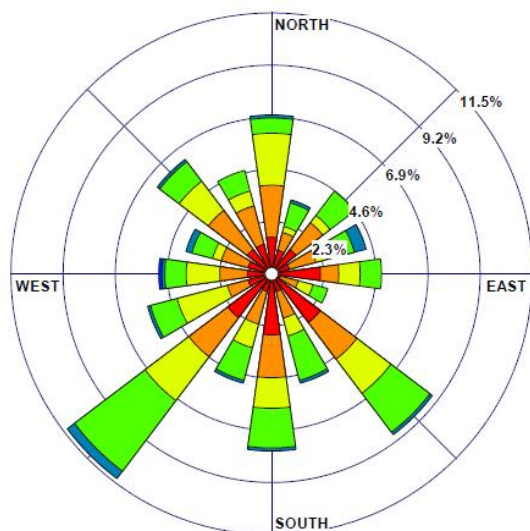
स्टेशन : पुरुलिया
 STATION : Purulia

		मौसम परिघटना						पवन														मेघ										दृश्यता					
		के साथ दिनों की संख्या						पवन की गती के साथ दिनों की संख्या (कि. मी. प्र. घं.)				पवन की दिशा के दिनों की संख्या का प्रतिशत										मेघ मात्रा (सभी मेघ) सहित दिनों की संख्या - अष्टमांश					निम्न स्तरी मेघ मात्रा सहित दिनों की संख्या - अष्टमांश					दृश्यता सहित दिनों की संख्या					
माह	वर्षा 0.3 मि.मि.या अधिक	ओले	गर्जन	कुहरा	धूल धरी आंधी	चंड वात	62 या अधिक	20-61	1-19	0	उ	उपू	पू	दपू	द	दप	प	उप	शांत	0	ले-2	3-5	6-7	8	0	ले-2	3-5	6-7	8	कुहरा 8	1 कि.मी. तक	1-4 कि.मी.	4-10 कि.मी.	10-20 कि.मी.	20 कि.मी. से अधिक		
		WEATHER PHENOMENA						WIND				CLOUD										VISIBILITY															
		No. OF DAYS WITH						No. OF DAYS WITH WIND SPEED (Km. p. h.)				PERCENTAGE No. OF DAYS WIND FROM										No. OF DAYS WITH CLOUD AMOUNT (ALL CLOUDS) O K T A S					No. OF DAYS WITH LOW CLOUD AMOUNT O K T A S					No. OF DAYS WITH VISIBILITY					
MONTH	PPT 0.3 mm Or more	HAIL	THUN DER	FOG	DUST STORM	SQU ALL	62 Or more	20-61	1-19	0	N	NE	E	SE	S	SW	W	NW	CALM	0	T-2	3-5	6-7	8	0	T-2	3-5	6-7	8	FOG 8	UP TO 1 Km.	1-4 Kms.	4-10 Kms.	10-20 Kms.	OVER 20 Kms.		
जनवरी JAN	I II	2.2	0.0	0.7	0.5	0.0	0.0	0	0	22	9	7	2	0	2	1	5	11	43	29	21	3	3	2	2	24	1	2	2	2	0	0.2	0.4	3.4	6.6	20.5	
फरवरी FEB	I II	3.3	0.1	2.3	0.1	0.1	0.0	0	0	20	8	10	2	1	3	1	8	10	38	27	18	3	3	2	2	20	2	2	2	2	0	0.0	0.5	3.6	5.0	19.0	
मार्च MAR	I II	3.6	0.3	3.7	0.2	0.4	0.0	0	0	22	9	7	2	1	3	3	9	11	34	30	19	4	4	2	2	24	2	2	1	2	0	0.0	0.4	3.4	4.7	22.4	
अप्रैल APR	I II	4.6	0.3	6.5	0.1	1.1	0.0	0	0	22	8	5	4	1	14	7	11	9	20	29	17	5	5	2	1	21	3	3	2	1	0	0.0	0.3	2.3	5.1	22.3	
मई MAY	I II	7.6	0.1	8.8	0.0	1.4	0.0	0	0	24	7	3	5	4	23	13	15	3	12	22	14	6	6	3	2	18	4	4	3	2	0	0.1	0.7	2.7	6.1	21.5	
जून JUN	I II	15.1	0.0	12.2	0.1	0.7	0.0	0	0	24	6	3	6	2	28	12	14	4	12	19	4	4	8	6	8	11	2	5	5	7	0	0.4	2.1	4.5	7.5	15.5	
जुलाई JUL	I II	21.5	0.0	12.6	0.0	0.0	0.0	0	0	24	7	2	6	4	20	7	24	3	11	23	0	1	6	10	14	3	2	6	8	12	0	0.2	2.8	7.4	11.0	9.5	
अगस्त AUG	I II	20.5	0.0	10.9	0.0	0.0	0.0	0	0	23	8	2	11	7	24	5	13	2	11	25	0	1	5	11	14	2	2	6	9	12	0	0.3	2.6	7.5	11.4	9.2	
सितम्बर SEP	I II	15.8	0.0	9.5	0.1	0.0	0.0	0	0	21	9	4	7	4	21	5	10	3	16	30	3	4	7	7	9	8	3	5	7	7	0	0.3	2.6	4.6	8.2	14.3	
अक्टूबर OCT	I II	6.3	0.0	3.2	0.3	0.0	0.0	0	0	20	11	7	6	3	6	3	5	4	30	36	14	4	5	4	4	18	3	3	3	4	0	0.0	0.9	3.3	5.9	21.0	
नवम्बर NOV	I II	2.2	0.0	0.4	0.1	0.0	0.0	0	0	21	9	8	4	0	2	1	2	6	48	29	18	4	4	2	2	22	2	2	2	2	0	0.0	0.2	3.3	4.4	22.1	
दिसम्बर DEC	I II	1.2	0.0	0.3	0.3	0.0	0.0	0	0	24	7	5	1	0	2	0	4	10	53	25	22	3	3	2	1	27	1	1	1	1	0	0.1	0.3	3.1	5.7	21.8	
वार्षिक योग या माध्य ANNUAL TOTAL OR MEAN	I II	104.0	0.8	71.2	1.7	3.7	0.0	0	1	267	97	5	5	2	13	5	10	6	27	27	152	42	58	54	59	201	27	39	44	54	0	1.4	13.6	49.1	80.7	220.1	
वर्षोंकी सं NUMBER OF YEARS	I II																																				
		30						30				30										30					30					30					

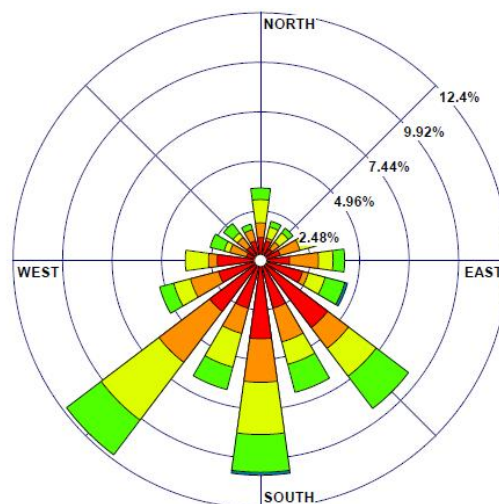
M/s AIC Iron Industries Pvt. Ltd.	Environmental Impact Assessment for proposed expansion of existing Steel Plant at Village: Benipur, P.O.: Saltor, P.S.: Neturia, Dist: Purulia, West Bengal	C3 - 40
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TABLE-3.7.2
ON-SITE METEOROLOGICAL DATA
(1st March, 2023 – 31st May, 2023)

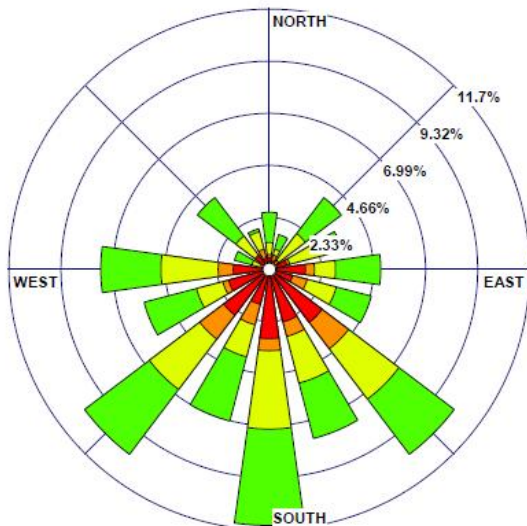
Month	Temperature (°C)		Relative Humidity (%)		Barometric Pressure (mm Hg)		Average Velocity (Km/hr)
	Max.	Min.	08:30 hrs.	17:30 hrs.	08:30 hrs.	17:30 hrs.	
March, 2023	32.0	23.5	73	47	755.7	749.9	6.25
April, 2023	42.5	22.5	70	56	753.7	749.2	4.70
May, 2023	44.5	25.5	68	47	753.6	747.9	6.51
Overall	44.5	22.5	73	47	755.7	749.2	5.82



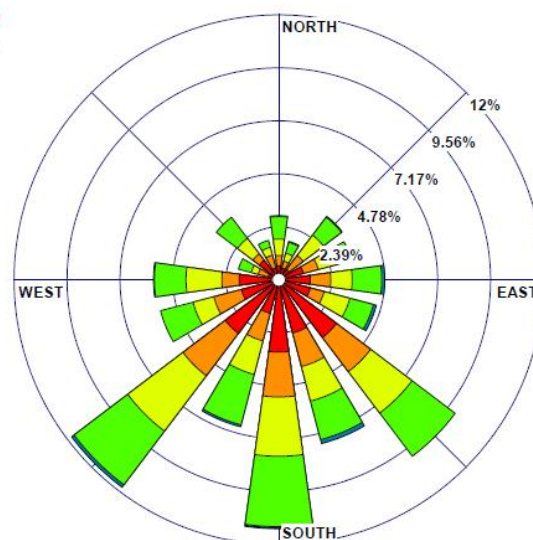
March, 2023
Calm: 9.95%



April, 2023
Calm: 19.28%



May, 2023
Calm: 11.02%



March, 2023 - May, 2023
Calm: 13.27%

FIGURE-3.7.1
WIND ROSE DIAGRAM FOR THE PERIOD OF
MARCH, 2023 TO MAY, 2023

M/s AIC Iron Industries Pvt. Ltd.	Environmental Impact Assessment for proposed expansion of existing Steel Plant at Village: Benipur, P.O.: Saltor, P.S.: Neturia, Dist: Purulia, West Bengal	C3 - 42
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3.8 AIR QUALITY

3.8.1 SELECTION OF MONITORING STATIONS

The sources of air pollution in the region are industrial emissions, vehicular traffic, dust arising from unpaved village roads and domestic fuel burning. The prime objective of the baseline air quality study was to establish the existing ambient air quality of the area. This will be useful for assessing the conformity to standards of the ambient air quality during the operation of the proposed expansion project.

The monitoring locations for establishing the baseline status of ambient air quality has been identified on the basis of the following considerations:

1. Meteorological conditions
2. Topography of the study area
3. Category of the area like habitat, forest etc.
4. Representative of likely affected area

Further, due consideration were also given to the likely affected zones during construction and operation of the plant. The location of human habitation and other sensitive areas within the study area were also considered in selection of ambient air quality monitoring locations.

Eight (8) numbers of monitoring stations were set up to assess the existing air quality of the study area. The locations of the monitoring stations were based on the frequent wind directions in order to site the stations as close as feasible to the anticipated maximum pollutant deposition areas, moreover, duly considering human habitation and proximity to sensitive zones within the study area. Logistic considerations as ready accessibility, security, availability of reliable power supply etc. were examined while finalizing the monitoring locations.

The Ambient Air Quality Monitoring locations have been presented in **Figure-3.8.1**. The relative direction, distance, latitude and longitude of these locations with respect to the project site have been tabulated in **Table-3.8.1**.

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3.8.2 PARAMETERS & FREQUENCY OF MONITORING

Ambient Air Quality Monitoring has been conducted for the period **(March, 2023 – May, 2023)** at a frequency of twice a week at each station adopting a continuous 24 hours schedule in respect of the following parameters:

- Particulate Matter-10 (PM₁₀)
- Particulate Matter-2.5 (PM_{2.5})
- Sulphur Dioxide (SO₂)
- Nitrogen Dioxide (NO₂)

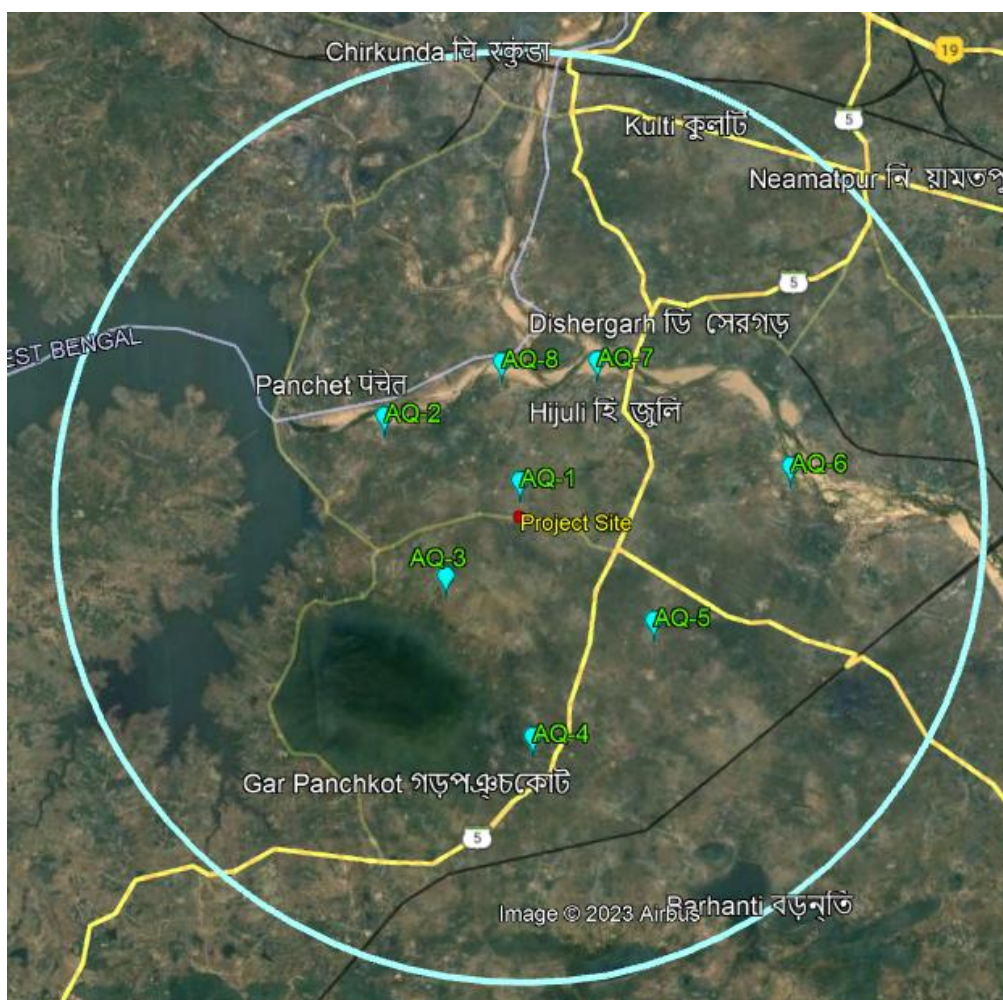
Carbon Monoxide (CO) monitoring has been conducted for the same period at a frequency of twice a week at each station adopting a continuous 8 hours schedule.

The equipment was placed at a height of 3.0 to 4.5 metres above ground level at each monitoring station, thus negating the effects of windblown ground dust. The equipment was placed at open space free from trees and other obstruction which otherwise act as a sink of pollutants resulting in lower levels in monitoring results. At locations close to highways, the equipment was placed at least 100 m away from such highways/roads to avoid influence of traffic exhaust emissions.

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TABLE - 3.8.1
AMBIENT AIR QUALITY MONITORING LOCATIONS

Sl. No.	Location Code	Location	Aerial Distance w.r.t. Project site (km)	Direction w.r.t. Project site	Latitude & Longitude
1.	AQ1	Near Project Site (Benipur)	0.3	N	23°39'34.74"N 86°47'51.07"E
2.	AQ2	Keliasota	3.4	NW	23°40'26.75"N 86°46'11.27"E
3.	AQ3	Tiltorya	2.9	SW	23°38'32.30"N 86°46'49.53"E
4.	AQ4	Madandi, Harmadih	5.2	S	23°36'36.20"N 86°47'46.86"E
5.	AQ5	Goaladi	4.0	SE	23°37'50.80"N 86°49'25.28"E
6.	AQ6	Asanbani	5.9	E	23°39'31.57"N 86°51'17.81"E
7.	AQ7	Saltore	3.3	NE	23°40'54.84"N 86°48'56.35"E
8.	AQ8	Deiliya	2.9	N	23°40'58.56"N 86°47'43.58"E



Sl. No.	Location Code	Location
1.	AQ1	Near Project Site (Benipur)
2.	AQ2	Keliasota
3.	AQ3	Tiltorya
4.	AQ4	Madandi, Harmadih
5.	AQ5	Goaladi
6.	AQ6	Asanbani
7.	AQ7	Saltore
8.	AQ8	Deiliya

FIGURE-3.8.1
AMBIENT AIR QUALITY MONITORING STATIONS

3.8.3 RESULTS & DISCUSSIONS

Statistical analysis (minimum, maximum, arithmetic mean and 98 percentile values) of the ambient air quality in the study area for the entire three months monitoring period are shown in **Table-3.8.2**. The results of such analysis are pictorially presented from **Figure-3.8.2** to **Figure-3.8.6**.

The following implications can be made on the basis of the obtained results:

3.8.3.1 Particulate Matter-10 (PM₁₀)

Arithmetic Mean of the 24-hourly average values of PM₁₀ varied station-wise between 62.8 $\mu\text{g}/\text{m}^3$ (at Keliyasota) to 77.2 $\mu\text{g}/\text{m}^3$ (Madandi, Harmadih) with overall mean of all 8 stations being 68.9 $\mu\text{g}/\text{m}^3$. Arithmetic Mean of the 24-hourly average values of PM₁₀ at all locations is under the limit of (100 $\mu\text{g}/\text{m}^3$) National Ambient Air Quality Standards, 2009.

The 24-hourly average 98-percentile values of PM₁₀ varied station-wise between 70.5 $\mu\text{g}/\text{m}^3$ (at Deiliya) and 90.0 $\mu\text{g}/\text{m}^3$ (Madandi, Harmadih), were observed to be well within the limit of 100 $\mu\text{g}/\text{m}^3$, as stipulated in the National Ambient Air Quality Standards, 2009.

3.8.3.2 Particulate Matter - 2.5 (PM_{2.5})

Arithmetic Mean of the 24-hourly average values of PM_{2.5} varied station-wise between 26.3 $\mu\text{g}/\text{m}^3$ (at Keliyasota) to 37.0 $\mu\text{g}/\text{m}^3$ (Madandi, Harmadih) with overall mean of all 8 stations being 30.6 $\mu\text{g}/\text{m}^3$. Arithmetic Mean of the 24-hourly average values of PM_{2.5} at all locations is under the limit of (60 $\mu\text{g}/\text{m}^3$) National Ambient Air Quality Standards, 2009.

The 24-hourly average 98-percentile values of PM_{2.5} (max 45.9 $\mu\text{g}/\text{m}^3$ observed at Madandi, Harmadih), at all the locations were observed to be well within the limit of 60 $\mu\text{g}/\text{m}^3$, as stipulated in the National Ambient Air Quality Standards, 2009.

3.8.3.3 Sulphur Dioxide (SO₂)

Arithmetic mean of 24-hourly average values of SO₂ varied station wise between 6.7 $\mu\text{g}/\text{m}^3$ (at Deiliya) to 13.6 $\mu\text{g}/\text{m}^3$ (at Madandi, Harmadih) with overall mean of all 8 stations being 8.6 $\mu\text{g}/\text{m}^3$. Arithmetic Mean of

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the 24-hourly average values of SO₂ at all locations is under the limit of (80 µg/m³) National Ambient Air Quality Standards, 2009.

The 24-hourly average 98-percentile values of SO₂ (max 17.0 µg/m³ observed at Madandi, Harmadih) at all the locations were well below the permissible limit of 80 µg/m³ for industrial areas, as stipulated in the National Ambient Air Quality Standards, 2009.

3.8.3.4 Nitrogen Dioxide (NO₂)

The overall arithmetic mean of 24-hourly average values of NO₂ over the entire study area was 23.8 µg/m³ while individual arithmetic mean levels computed at 8 stations ranged between 17.3 µg/m³ (at Goaladi) to 28.8 µg/m³ (at Saltore). Arithmetic Mean of the 24-hourly average values of NO₂ at all locations is under the limit of (80 µg/m³) National Ambient Air Quality Standards, 2009.

The 24-hourly average 98-percentile values of NO₂ (max 34.5 µg/m³ observed at Benipur, near Project Site) at all the locations were well below the permissible limit of 80 µg/m³, as stipulated in the National Ambient Air Quality Standards, 2009.

3.8.3.5 Carbon Monoxide (CO)

The overall arithmetic mean of 8-hourly average values of CO over the entire study area was 0.428 mg/m³ while individual arithmetic mean levels computed at 8 stations ranged between 0.332 mg/m³ (at Saltore) to 0.558 mg/m³ (at Madandi, Harmadih). Arithmetic Mean of the 24-hourly average values of CO at all locations is under the limit of (2 mg/m³) National Ambient Air Quality Standards, 2009.

The 24-hourly average 98-percentile values of CO (max 0.947 mg/m³ observed at Madandi, Harmadih) at all the locations were well below the permissible limit of 2 mg/m³, as stipulated in the National Ambient Air Quality Standards, 2009.

CONCLUSION:

The values of all the ambient air parameters i.e., PM₁₀, PM_{2.5}, SO₂, NO_x and CO at the respective 8 monitoring locations are within the limits on all the occasions as per NAAQ Standard. The maximum value of PM₁₀ is observed at Benipur, near project site (87 µg/m³). This may be attributed to the presence of few existing steel plants operating in the close vicinity of the proposed project site as well as due to the vehicular emissions in the area.

TABLE-3.8.2
STATISTICAL ANALYSIS RESULTS OF AIR POLLUTANTS
(Period: March, 2023 - May, 2023)

POLLUTANTS	LOCATIONS	MES	MIN	MAX	A.M.	P-98
PM₁₀ (µg/m³)	Near Project Site (Benipur)	26	65	84	74.6	84.0
	Keliasota	26	51	74	62.8	73.5
	Tiltorya	26	56	78	64.6	76.0
	Madandi, Harmadih	26	63	87	77.2	90.0
	Goaladi	26	60	83	71.0	83.5
	Asanbani	26	54	75	66.7	75.0
	Saltore	26	59	82	69.3	81.0
	Deiliya	26	57	71	64.7	70.5
	Overall	208	51	87	68.9	-
PM_{2.5} (µg/m³)	Near Project Site(Benipur)	26	30	41	35.0	41.2
	Keliasota	26	17	34	26.3	33.6
	Tiltorya	26	21	38	28.1	36.9
	Madandi, Harmadih	26	28	46	37.0	45.9
	Goaladi	26	27	40	33.1	40.1
	Asanbani	26	18	35	29.0	34.5
	Saltore	26	23	37	29.3	36.4
	Deiliya	26	20	33	26.9	32.6
	Overall	208	17	46	30.6	-
SO₂ (µg/m³)	Near Project Site(Benipur)	26	9	16	11.8	16.0
	Keliasota	26	5	11	7.7	11.0
	Tiltorya	26	6	13	8.3	12.5
	Madandi, Harmadih	26	11	17	13.6	17.0
	Goaladi	26	6	12	9.4	12.0
	Asanbani	26	7	13	9.7	13.0
	Saltore	26	8	12	10.0	11.5
	Deiliya	26	4	9	6.7	9.0
	Overall	208	4	17	9.6	-
NO₂ (µg/m³)	Near Project Site(Benipur)	26	19	36	25.7	34.5
	Keliasota	26	13	24	18.1	24.0
	Tiltorya	26	15	26	19.6	25.5
	Madandi, Harmadih	26	21	33	28.3	33.0
	Goaladi	26	12	23	17.3	22.5
	Asanbani	26	17	32	25.0	32.0
	Saltore	26	20	35	28.8	34.5
	Deiliya	26	14	25	18.5	24.5
	Overall	208	12	36	22.7	-

TABLE-3.8.2 (Contd...)
STATISTICAL ANALYSIS RESULTS OF AIR POLLUTANTS
(Period: March, 2023 - May, 2023)

POLLUTANTS	LOCATIONS	MES	MIN	MAX	A.M.	P-98
CO (mg/m³)	Near Project Site(Benipur)	78	0.152	0.777	0.461	0.749
	Keliasota	78	0.149	0.595	0.356	0.581
	Tiltorya	78	0.172	0.760	0.462	0.723
	Madandi, Harmadih	78	0.245	0.981	0.558	0.947
	Goaladi	78	0.179	0.861	0.443	0.802
	Asanbani	78	0.169	0.718	0.376	0.654
	Saltore	78	0.165	0.625	0.332	0.561
	Deiliya	78	0.165	0.772	0.440	0.745
	Overall	624	0.149	0.981	0.428	-
N.B.: MES - No. of measurements, MIN - Minimum, MAX - Maximum, A.M. - Arithmetic Mean, P-98 - 98 Percentile.						

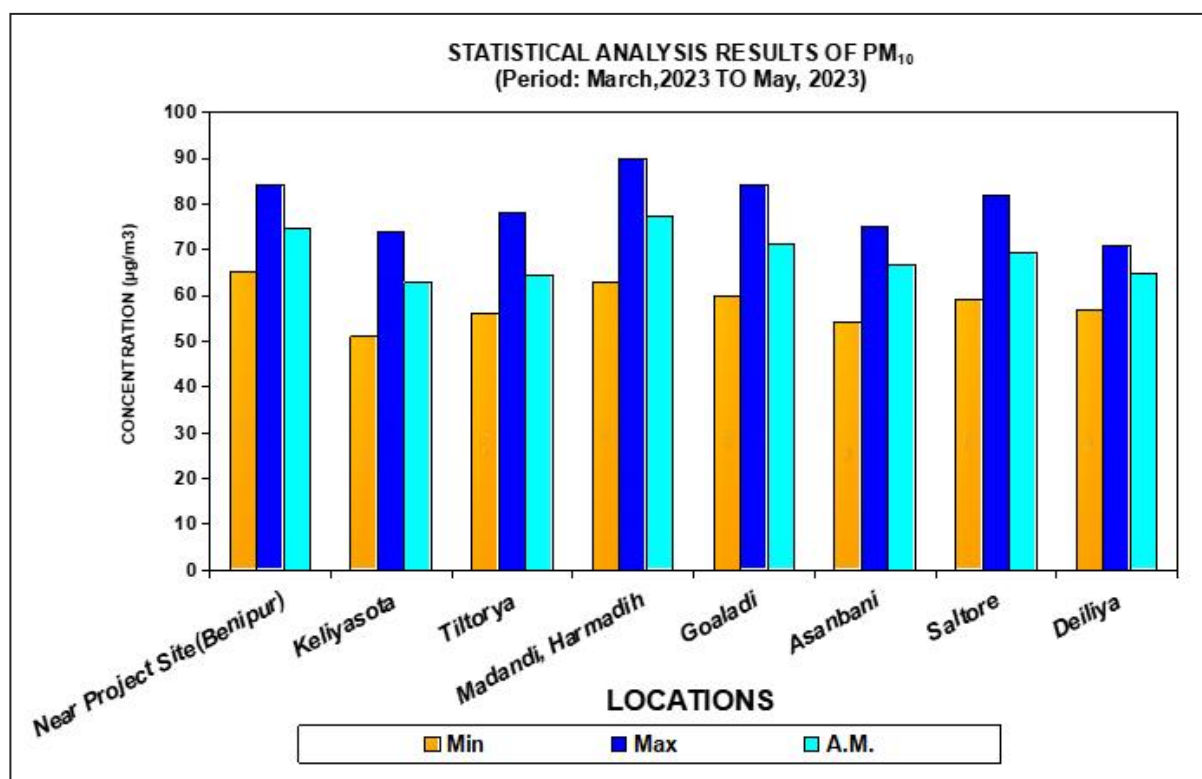


FIGURE-3.8.2: DIAGRAM OF PM₁₀ OF ALL AAQM STATIONS

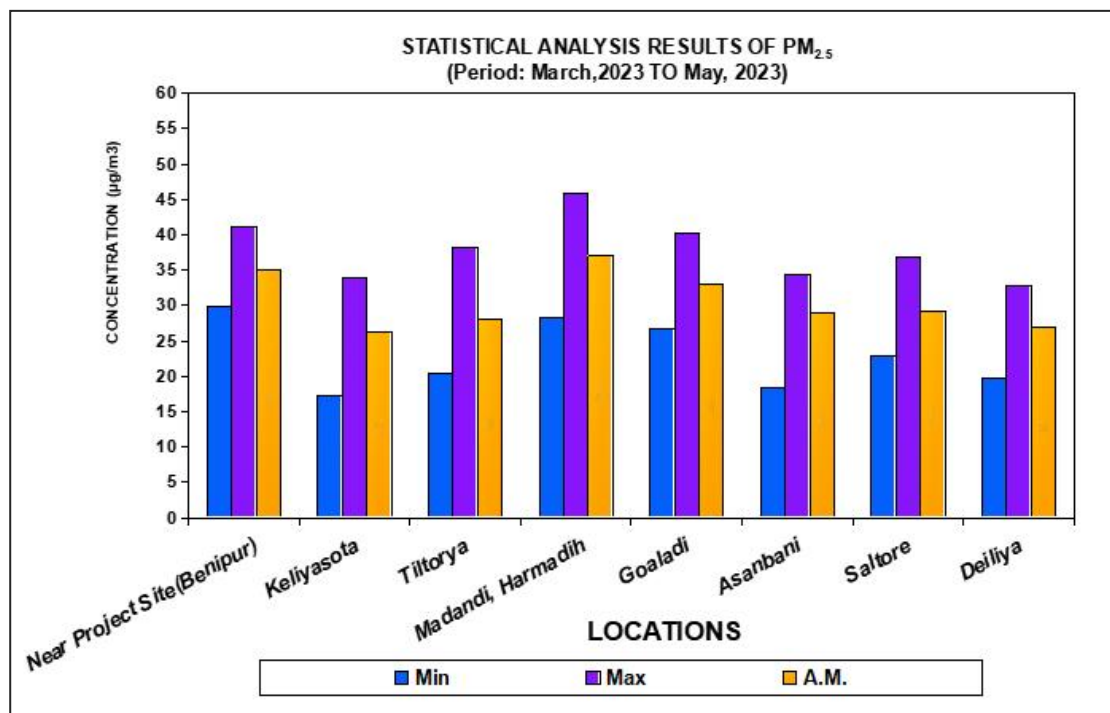


FIGURE-3.8.3: DIAGRAM OF PM_{2.5} OF ALL AAQM STATIONS

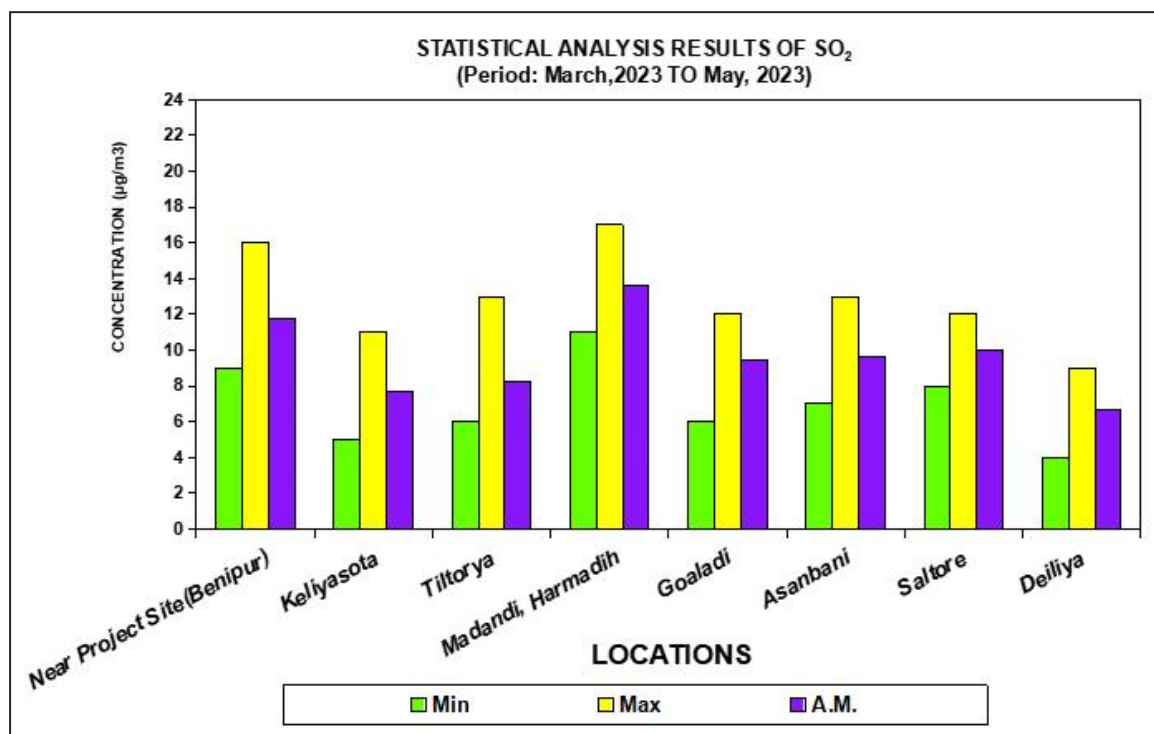


FIGURE-3.8.4: DIAGRAM OF SO₂ OF ALL AAQM STATIONS

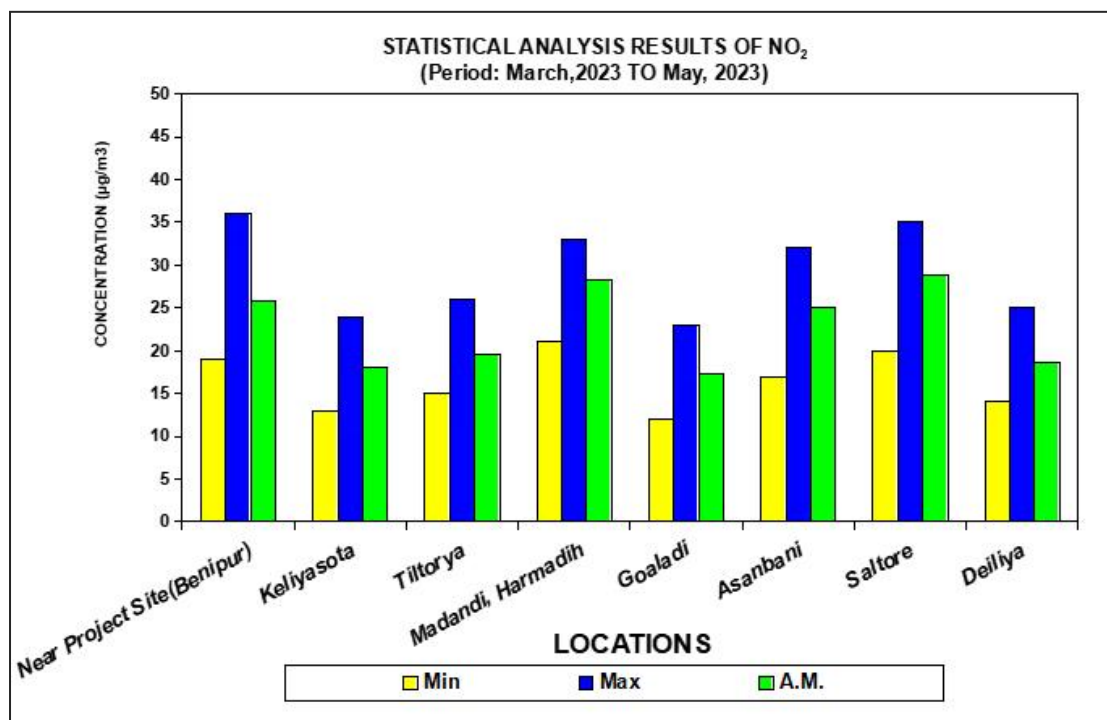


FIGURE-3.8.5: DIAGRAM OF NO₂ OF ALL AAQM STATIONS

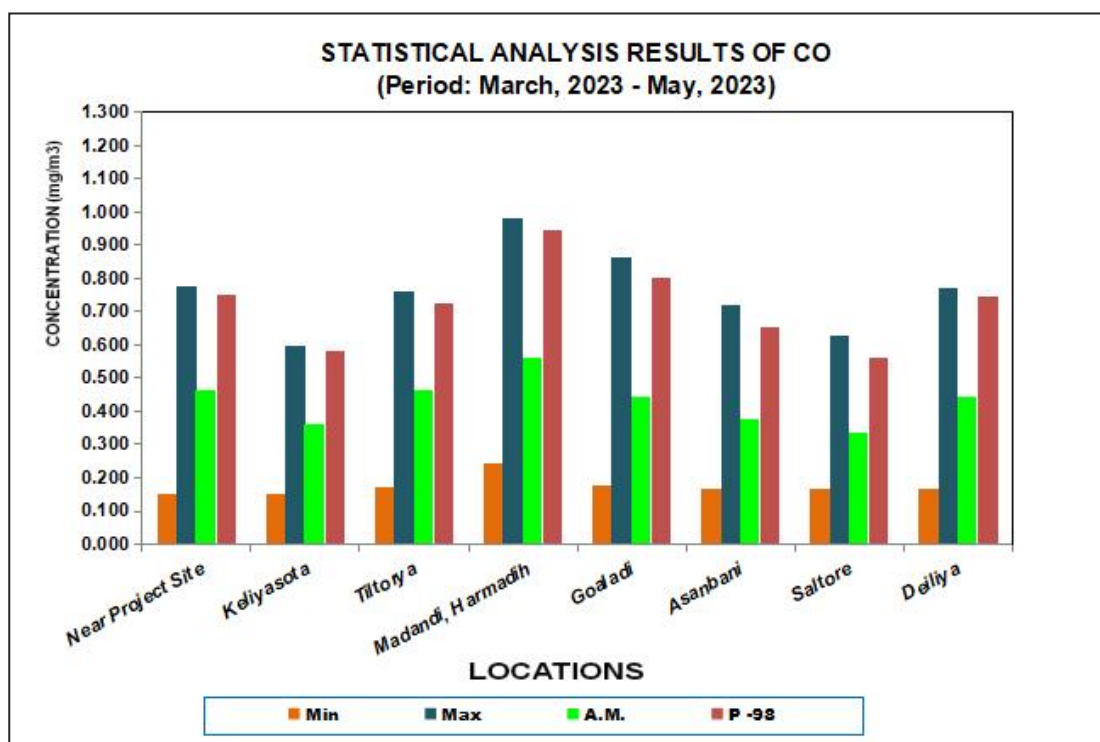


FIGURE-3.8.6: DIAGRAM OF CO OF ALL AAQM STATIONS

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3.8.4 TRAFFIC STUDY ANALYSIS

The traffic studies have been conducted to know the prevailing traffic volumes on the roads in the study area. It is essential to consider these details for assessing the anticipated future traffic volumes as a part of overall impacts assessment for the project. The variations of traffic densities depend upon the working days and time and also vary in day and night times. In order to assess the prevailing traffic volumes on the roads, the survey was conducted during normal working days of the week by avoiding local holidays or abnormal situations to reflect the true picture of the traffic densities.

The project site of M/s AIC Iron Industries Pvt. Ltd. is surrounded by two roads i.e., State Highway-5 (Rupnarayanpur - Junput) is passing around 2.2 km towards east-south-east direction w.r.t. the project site and a local road connects the proposed project site with SH-5 at Sarbari More. The same local road connects Panchet Dam with SH-5.

Traffic density was monitored on following two locations

- a) **Location No. - 1** : On Sarbari-Panchet Road near Project site
- b) **Location No. - 2** : On State Highway-5 near Sarbari More

Traffic density was monitored under four different vehicle categories i.e., Heavy, Medium, Light and two wheelers. The heavy vehicles included trucks, buses, cranes etc. The medium vehicles included mini buses, matadors etc. while cars, jeeps, auto rickshaws and trekkers were considered under the light vehicles category.

The data were recorded once for a day in the month of April, 2023, for continuous 24 hours in a day. The relevant account has been gathered in **Tables-3.8.3 & 3.8.4** respectively. The two location points of Traffic survey analysis has been presented in **Figure-3.8.7**.

TABLE-3.8.3
NAME OF THE LOCATION: ON SARBARI-PANCHET ROAD NEAR PROJECT SITE
DATE OF SAMPLING: 13.04.2023

Hour	HEAVY	MEDIUM	LIGHT	TWO WHEELERS	TOTAL
0700 - 0800	6	4	14	19	43
0800 - 0900	4	3	15	21	43
0900 - 1000	4	2	19	19	44
1000 - 1100	5	4	21	22	52
1100 - 1200	5	5	24	14	48
1200 - 1300	7	2	23	16	48
1300 - 1400	4	4	17	19	44
1400 - 1500	5	3	16	12	36
1500 - 1600	5	3	12	23	43
1600 - 1700	5	4	15	17	41
1700 - 1800	4	6	19	24	53
1800 - 1900	8	5	21	25	59
1900 - 2000	5	3	17	19	44
2000 - 2100	3	4	14	10	31
2100 - 2200	4	5	16	11	36
2200 - 2300	4	7	13	7	31
2300 - 0000	2	4	11	6	23
0000 - 0100	3	3	7	6	19
0100 - 0200	2	4	5	3	14
0200 - 0300	2	2	2	4	10
0300 - 0400	3	2	3	4	12
0400 - 0500	1	2	3	8	14
0500 - 0600	3	4	6	12	25
0600 - 0700	5	5	9	16	35
Total	99	90	322	337	848
Note : HEAVY : Truck, Bus, Cranes MEDIUM : Minibus, Matador LIGHT : Car, Jeep, Auto Rickshaw, Trekker					

TABLE-3.8.4
NAME OF THE LOCATION: ON STATE HIGHWAY-5 NEAR SARBARI MORE
DATE OF SAMPLING: 14.04.2023

HOURLY	HEAVY	MEDIUM	LIGHT	TWO WHEELERS	TOTAL
0700 - 0800	21	19	31	27	98
0800 - 0900	19	18	37	30	104
0900 - 1000	22	21	39	34	116
1000 - 1100	17	20	40	31	108
1100 - 1200	20	29	37	28	114
1200 - 1300	23	24	32	29	108
1300 - 1400	19	23	27	26	95
1400 - 1500	20	24	29	25	98
1500 - 1600	22	23	20	24	89
1600 - 1700	27	27	29	27	110
1700 - 1800	29	21	27	33	110
1800 - 1900	23	27	32	28	110
1900 - 2000	17	29	27	24	97
2000 - 2100	20	27	24	26	97
2100 - 2200	19	20	23	22	84
2200 - 2300	20	10	26	23	79
2300 - 0000	14	9	22	17	62
0000 - 0100	18	5	19	14	56
0100 - 0200	13	7	15	11	46
0200 - 0300	13	5	14	9	41
0300 - 0400	15	6	12	8	41
0400 - 0500	22	7	10	10	49
0500 - 0600	19	10	16	14	59
0600 - 0700	20	20	20	20	80
Total	472	431	608	540	2051
Note : HEAVY : Truck, Bus, Cranes MEDIUM : Minibus, Matador LIGHT : Car, Jeep, Auto Rickshaw, Trekker					

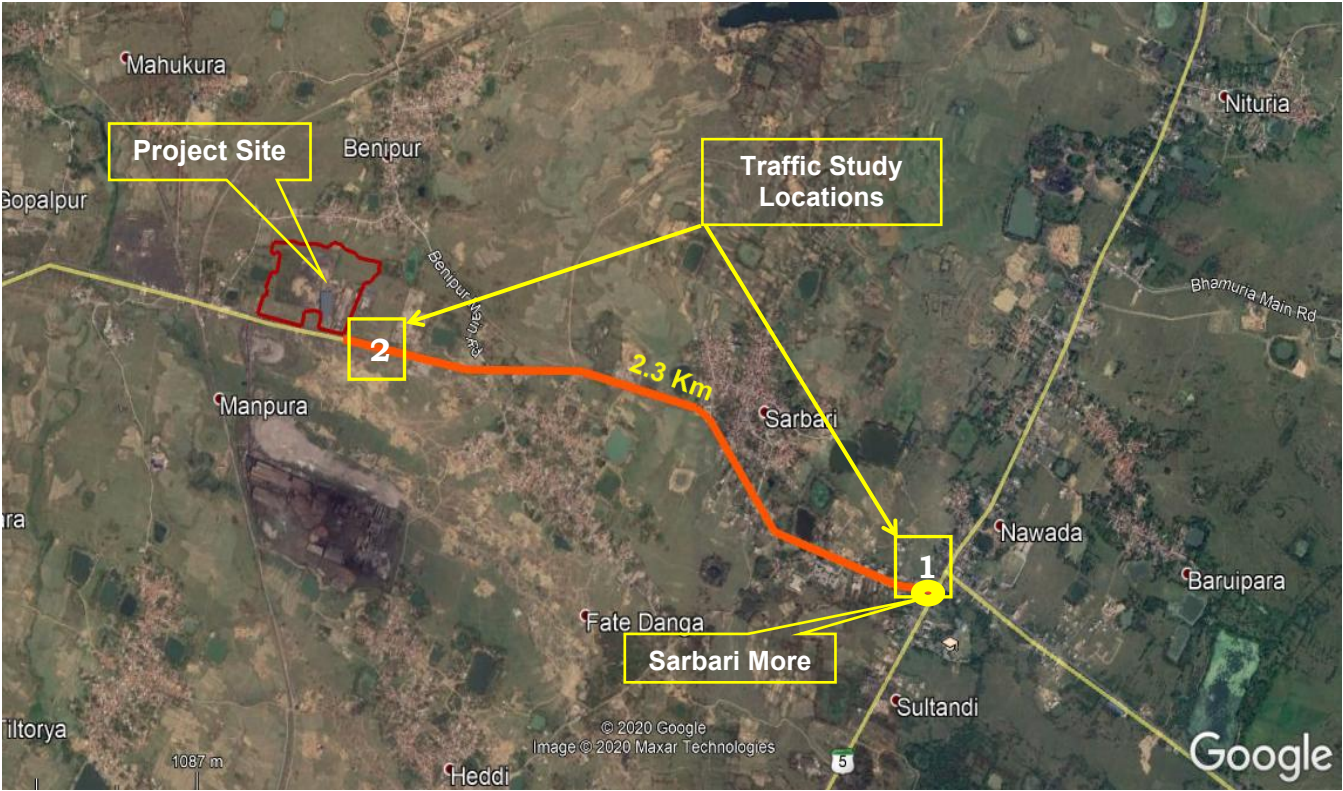


FIGURE-3.8.7
LOCATION POINT OF TRAFFIC SURVEY ANALYSIS

3.9 WATER ENVIRONMENT

WATER BODIES IN THE STUDY AREA

The major surface water bodies in the study area are the Panchet Dam (Reservoir), Damodar River, Barakar River and Khudia River. The River Damodar is mainly perennial in nature, which means it has sufficient water to flow all around the year. The nearest distance of the Damodar River is 2.8 Km from the Project Site. River Barakar is the main tributary of the River Damodar. River Barakar meets with the River Damodar at Fatepur. Khudia River is the main tributary of the River Barakar. The confluence point of the River Barakar and the river Khudia is at Hatinal. Besides, a number of confined water bodies, viz. tanks, ponds, jheels, roadside burrows etc. which form a part of surface hydrological system, exist within the study area. As the River Damodar is the main drainage channel of the region, this river receives pollution loads of industrial and domestic waste water and also agricultural run-off. Ground water sources are mainly bore wells, tube wells and dug wells which are scattered in the whole study area.

PRESENT WATER USE

The water demand of the area can be broadly classified into domestic, agricultural and industrial. All these demands are met from both surface and ground water sources.

WATER SAMPLING

As surface water, water samples were collected and analyzed from total ten (10) locations, including one (1) location from the Panchet Reservoir, two (2) different locations from the River Damodar and from seven (7) different ponds of different locations. As ground water, water samples were collected and analyzed from total nine (9) different locations of bore-wells and tube-wells to assess the baseline status of the whole water quality in the study area.

All the samples were analyzed with respect to physical, chemical and biological parameters including toxic organics and metals, adopting Standard methods. The locations of the sampling points for both surface and ground water are tabulated in **Table-3.9.1**.

3.9.1 SURFACE WATER QUALITY

Surface Water samples were collected from one (1) location (**SW1**) for the Panchet Reservoir; two (2) different locations (**SW2 & SW3**) for the River

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Damodar and seven (7) different locations for ponds (**SW4 to SW10**) to analyze and assess the surface water quality of the study area.

All the samples were analyzed with respect to physical, chemical and biological parameters including toxic organics and metals, adopting Standard methods. Sampling and analysis of surface water were carried out following the analysis techniques and methodology described in relevant Indian Standards. Analysis results of all surface water samples were compared with CPCB Water Quality Criteria for Surface Water.

As per the standard of Central Pollution Control Board (CPCB), criteria for Surface Water Quality is tabulated in **Table-3.9.4**.

RESULTS OF SURFACE WATER QUALITY MONITORING:

Results of Water Quality from the Panchet Reservoir:

The pH value of a collected water sample (**SW1**) from the Panchet Reservoir was found 7.2. Value of Dissolved Oxygen was observed 7.2 mg/lit. BOD and COD were observed 2 mg/lit and 7 mg/lit respectively. Total Dissolved Solids was found 183 mg/lit while value of total Hardness was found 122 mg/lit. Calcium & Magnesium were found 35 mg/lit and 9 mg/lit respectively. Oil and grease was below detection limit (<1.4 mg/lit). Sulphate, Nitrate and Chloride were observed 15 mg/lit, 1.2 mg/lit and 34 mg/lit respectively. Iron content was found 0.1 mg/lit in this sample. Sodium Absorption Ratio (SAR) was 0.6 in this sample. Results have been compiled in **Table-3.9.2**.

Results of Water Quality from the River Damodar:

The water quality monitoring results of two (2) water samples (**SW2** - near Narayanpur, & **SW3** - near Parbeliya) from the River Damodar have been compiled in **Table-3.9.2**.

The pH values of the collected two water samples (**SW2 & SW3**) from the River Damodar were found 7.2 and 7.3. Values of Dissolved Oxygen were observed (7.1 & 7.3) mg/lit. BOD and COD were observed 2 mg/lit and (8 & 10) mg/lit respectively. Total Dissolved Solids were found (196 & 204) mg/lit while values of total Hardness were found (134 & 138) mg/lit. Calcium & Magnesium were found (36 & 37) mg/lit and (10 & 12) mg/lit respectively. Oil and grease were below detection limit (<1.4 mg/lit) in both samples. Sulphate, Nitrate and Chloride were observed (14 & 22) mg/lit, (1.6 & 1.8) mg/lit and (35 & 38) mg/lit respectively. Iron contents were found (0.12 & 0.14) mg/lit respectively in these samples. Sodium Absorption Ratio (SAR) were 0.6 in these two samples.

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Results of Pond Water Quality:

The water quality monitoring results of seven (7) pond water samples (**SW4** to **SW10**) have been compiled in **Table-3.9.2**.

The pH values of the collected pond water samples were found in the range of (6.8 - 7.2). Dissolved Oxygen was observed in the ranges of (6.1 - 6.9) mg/lit. BOD and COD were observed ranging from (4 - 7) mg/lit and (15 - 24) mg/lit respectively. Total Dissolved Solids were found in the ranges of (297 - 467) mg/lit while Total Hardness was found in the ranges of (138 - 220) mg/lit. Calcium & Magnesium were found varying in the ranges of (39 - 62) mg/lit and (6 - 16) mg/lit respectively. Oil and grease was below detection limit (<1.4 mg/lit) in these samples. Sulphate, Nitrate and Chloride were observed varying in the ranges of (21 - 42) mg/lit, (3.5 - 5.5) mg/lit and (67 - 127) mg/lit respectively. Values of Iron and zinc contents were found in the ranges of (0.13 - 0.17) and (<0.05 - 0.11) mg/lit respectively. Sodium Absorption Ratio (SAR) were ranging from 1.5 to 2.7 in these two samples.

Heavy metals like copper, lead, manganese, arsenic, mercury, cadmium and chromium of all the surface water samples (**SW1** - **SW10**) were below their respective detection limits. Cyanide, Phenol, Boron, Hexavalent Chromium and Ammonia etc. were also below their respective detection limits.

3.9.2 GROUND WATER QUALITY

Total nine (9) Ground Water samples (**GW1** to **GW9**) were collected from bore wells and tube wells of different locations to assess the baseline status of ground water quality of the surrounding 10 km radius study area.

Sampling and analysis of ground water were carried out following the analysis techniques and methodology described in relevant Indian Standards. The ground water quality monitoring results have been tabulated in **Table-3.9.3**.

RESULTS OF GROUND WATER QUALITY MONITORING:

The pH values of collected ground water samples were found in the range of (6.7 - 7.5). Values of Total Dissolved Solids (TDS) were found in the ranges of (337 - 515) mg/lit while Total Hardness were found in the ranges of (190 - 310) mg/lit. Calcium and Magnesium were found varying in the ranges of (50 - 89) mg/lit and (8 - 22) mg/lit respectively. Sulphate, Nitrate and Chloride were observed in the ranges of (12 - 30)

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mg/lit, (2.5 - 4.8) mg/lit and (89 - 138) mg/lit respectively. Iron contents were found in the ranges of (0.23 - 0.45) mg/lit and zinc contents were found varying in ranges of (0.09 - 0.15) mg/lit. Alkalinity was found in the ranges of (177 - 254) mg/lit.

Other heavy metals like copper, lead, manganese, arsenic, mercury, cadmium and chromium were below their respective detection limits in all the ground water samples.

Conclusion on Ground Water Samples:

Ground water physico-chemical properties in the study area showed that the water Strata mainly from Carbonate – Bicarbonate buffer system has appreciable amount of alkalinity, calcium & Magnesium which are beneficial for human health. The other parameters are also within the acceptable limit. Hence, ground water at the monitoring locations is fit for direct human consumption as per the drinking water norms of BIS-10500.

It may be worthy to record that the plant will be developed based on Zero Liquid Discharge (ZLD) Concept. As such due to the plant activities, various sources of water including ground water will not be affected so far as their quality is concerned.

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TABLE-3.9.1
Water Quality Monitoring Locations in the study area

Sample Code	Locations	Latitude	Longitude
SURFACE WATER:			
SW1	Panchet Dam (Near Chakaltabari)	23°39'17.90"N	86°44'54.61"E
SW2	Damodar River (Near Narayanpur)	23°40'45.99"N	86°47'06.02"E
SW3	Damodar River (Near Parbeliya)	23°40'51.28"N	86°49'29.33"E
SW4	Pond Water (Near Bhamuria)	23°39'29.78"N	86°50'32.04"E
SW5	Pond Water (Near Goaladih)	23°38'03.78"N	86°49'21.38"E
SW6	Pond Water (Near Sarbari)	23°39'10.78"N	86°48'49.92"E
SW7	Pond Water (Near Ranipur)	23°40'15.71"N	86°48'07.08"E
SW8	Pond Water (Near Keliyasota)	23°40'04.00"N	86°46'10.14"E
SW9	Pond Water (Near Marjadpur)	23°39'11.32"N	86°46'34.87"E
SW10	Pond Water (Near Nutandi)	23°38'11.78"N	86°46'48.82"E
GROUND WATER:			
GW1	Benipur, near Project Site (Borewell)	23°39'41.45"N	86°47'57.09"E
GW2	Chak Atlabari (Tubewell)	23°39'10.52"N	86°45'13.08"E
GW3	Keliyasota (Tubewell)	23°40'21.24"N	86°45'56.62"E
GW4	Nadiha (Tubewell)	23°39'52.39"N	86°46'23.81"E
GW5	Deilya (BoreWell)	23°40'47.42"N	86°47'53.80"E
GW6	Kuchahela (Tubewell)	23°39'48.72"N	86°48'03.85"E
GW7	Neturia(Borewell)	23°39'40.75"N	86°49'40.52"E
GW8	Goaladi (Tubewell)	23°37'52.74"N	86°49'23.35"E
GW9	Nutandi (Tubewell)	23°38'11.58"N	86°47'14.40"E

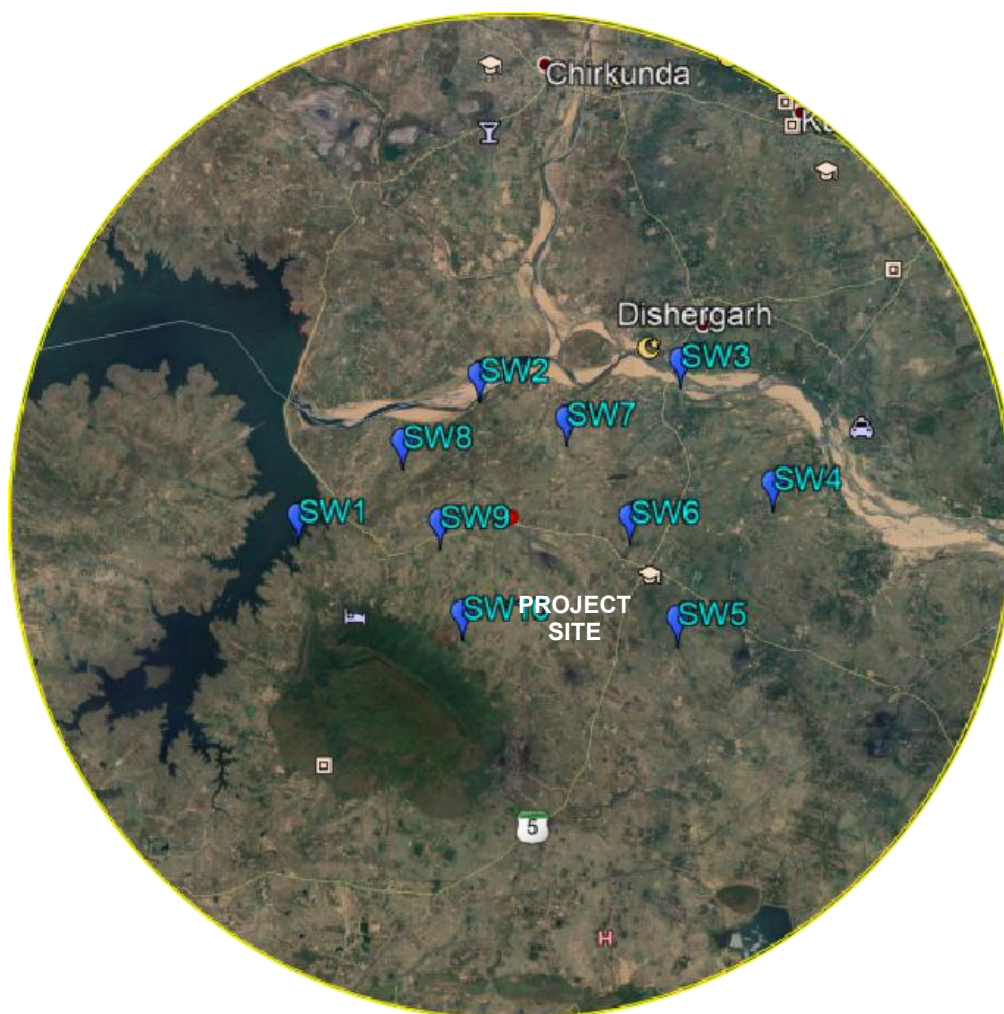


FIGURE-3.9.1
SURFACE WATER SAMPLING LOCATIONS

Sample Code	Locations
Surface Water:	
SW1	Panchet Dam (Near Chakaltabari)
SW2	Damodar River (Near Narayanpur)
SW3	Damodar River (Near Parbeliya)
SW4	Pond Water (Near Bhamuria)
SW5	Pond Water (Near Goaladih)
SW6	Pond Water (Near Sarbari)
SW7	Pond Water (Near Ranipur)
SW8	Pond Water (Near Keliyasota)
SW9	Pond Water (Near Marjadpur)
SW10	Pond Water (Near Nutandi)

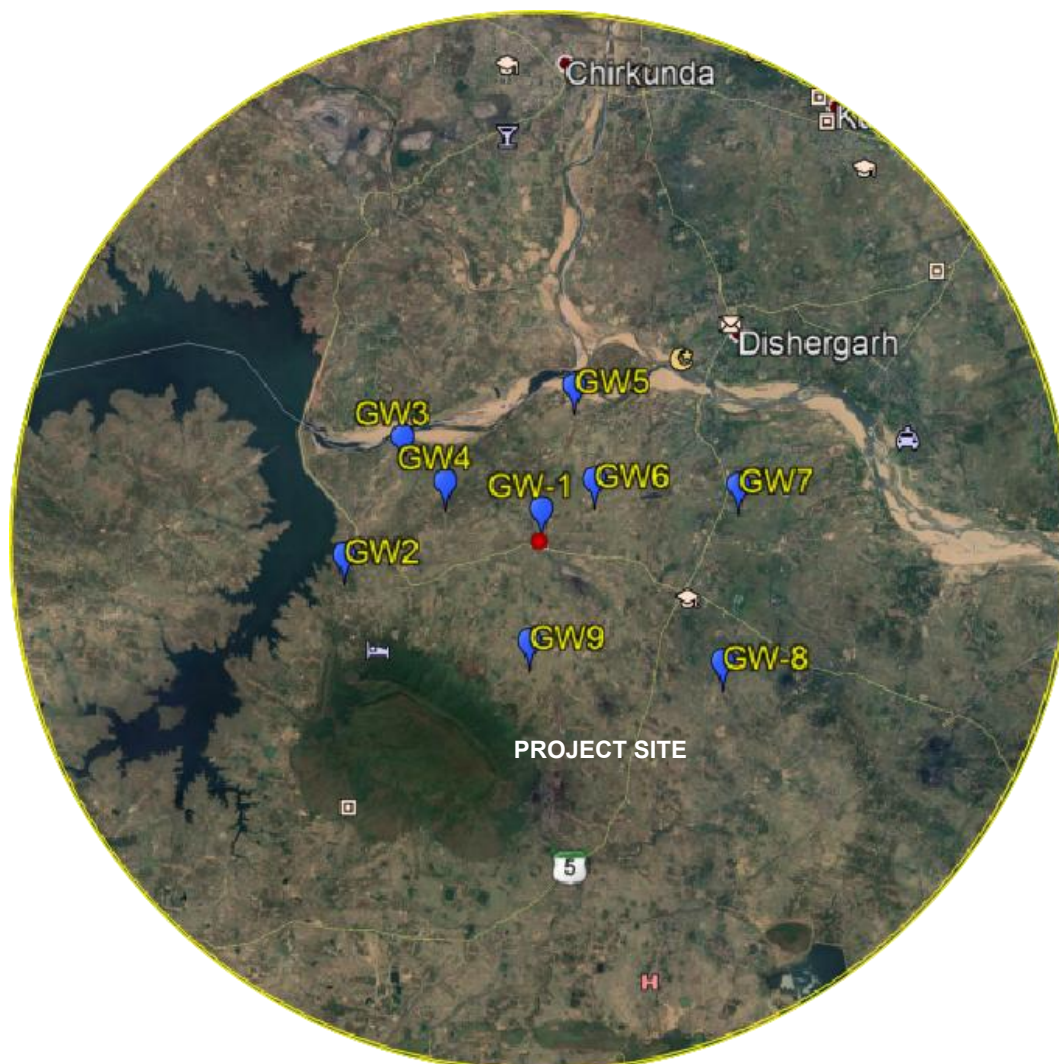


FIGURE-3.9.2
GROUND WATER SAMPLING LOCATIONS

Sample Code	Locations
Ground Water:	
GW1	Benipur, near Project Site (Borewell)
GW2	Chak Atlabari (Tubewell)
GW3	Keliyasota (Tubewell)
GW4	Nadiha (Tubewell)
GW5	Deilya (BoreWell)
GW6	Kuchahela (Tubewell)
GW7	Neturia(Borewell)
GW8	Goaladi (Tubewell)
GW9	Nutandi (Tubewell)

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TABLE-3.9.2
SURFACE WATER QUALITY

Sl. No.	Parameters	Unit	CONCENTRATIONS (SW1 -SW5)				
			SW1	SW2	SW3	SW4	SW5
1	Colour	Hazen unit	<5	<5	<5	<5	<5
2	Odour	-	Unobj.	Unobj.	Unobj.	Unobj.	Unobj.
3	pH	-	7.22	7.27	7.32	7.24	6.91
4	Conductivity	µmhos/cm	311	335	351	564	757
5	Dissolved Oxygen	mg/L	7.2	7.3	7.1	6.2	6.5
6	Chemical Oxygen Demand	mg/L	7	8	10	24	20
7	Biochemical Oxygen Demand (3 days at 270C)	mg/L	2	2	2	7	6
8	Total Coliforms	MPN/100 ml	2400	2600	3100	1700	1400
9	Total Dissolved Solids	mg/L	183	196	204	330	441
10	Oil & Grease	mg/L	<1.4	<1.4	<1.4	<1.4	<1.4
11	Phenol (as C6H5OH)	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
12	Total Hardness (as CaCO3)	mg/L	122	134	138	162	182
13	Chloride (as Cl)	mg/L	34	38	35	74	124
14	Sulphate (as SO4)	mg/L	15	14	22	33	41
15	Nitrate (as NO3)	mg/L	1.2	1.8	1.6	4.2	5.5
16	Fluoride (as F)	mg/L	0.28	0.41	0.38	0.35	0.39
17	Calcium (as Ca)	mg/L	35	37	36	51	56
18	Magnesium (as Mg)	mg/L	9	10	12	9	10
19	Copper (as Cu)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
20	Iron (as Fe)	mg/L	0.1	0.12	0.14	0.16	0.14
21	Manganese (as Mn)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
22	Zinc (as Zn)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
23	Boron (as B)	mg/L	<0.02	<0.02	<0.02	<0.02	<0.02
24	Arsenic (as As)	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002
25	Mercury (as Hg)	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
26	Lead (as Pb)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
27	Cadmium (as Cd)	mg/L	<0.003	<0.003	<0.003	<0.003	<0.003
28	Hexavalent Chromium (as Cr+6)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
29	Total Alkalinity (as CaCO3)	mg/L	111	121	128	162	172
30	Ammonia (as NH3-N)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
31	Sodium Absorbance Ratio	-	0.6	0.6	0.6	1.7	2.7

(Unobj. – Unobjectionable)

CODE	LOCATION NAME
SW1	Panchet Dam (Near Chakaltabari)
SW2	Damodar River (Near Narayanpur)
SW3	Damodar River (Near Parbeliya)
SW4	Pond Water (Near Bhamuria)
SW5	Pond Water (Near Goaladih)

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TABLE-3.9.2 (Continued)
SURFACE WATER QUALITY

Sl. No.	Parameters	Unit	CONCENTRATIONS (SW6-SW10)				
			SW6	SW7	SW8	SW9	SW10
1	Colour	Hazen unit	<5	<5	<5	<5	<5
2	Odour	-	Unobj.	Unobj.	Unobj.	Unobj.	Unobj.
3	pH	-	6.77	7.21	6.88	6.93	7.16
4	Conductivity	µmhos/cm	542	564	792	521	505
5	Dissolved Oxygen	mg/L	6.3	6.1	6.3	6.6	6.9
6	Chemical Oxygen Demand	mg/L	18	21	24	18	15
7	Biochemical Oxygen Demand (3 days at 270C)	mg/L	5	6	6	5	4
8	Total Coliforms	MPN/100 ml	1100	2100	1700	1100	930
9	Total Dissolved Solids	mg/L	315	332	467	305	297
10	Oil & Grease	mg/L	<1.4	<1.4	<1.4	<1.4	<1.4
11	Phenol (as C6H5OH)	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
12	Total Hardness (as CaCO3)	mg/L	166	154	220	158	138
13	Chloride (as Cl)	mg/L	76	91	127	67	69
14	Sulphate (as SO4)	mg/L	29	29	42	21	29
15	Nitrate (as NO3)	mg/L	4.2	5.5	3.5	3.8	4.5
16	Fluoride (as F)	mg/L	0.34	0.35	0.56	0.44	0.37
17	Calcium (as Ca)	mg/L	42	51	62	50	39
18	Magnessium (as Mg)	mg/L	15	6	16	8	10
19	Copper (as Cu)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
20	Iron (as Fe)	mg/L	0.14	0.15	0.17	0.14	0.13
21	Manganese (as Mn)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
22	Zinc (as Zn)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
23	Boron (as B)	mg/L	<0.02	<0.02	<0.02	<0.02	<0.02
24	Arsenic (as As)	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002
25	Mercury (as Hg)	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
26	Lead (as Pb)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
27	Cadmium (as Cd)	mg/L	<0.003	<0.003	<0.003	<0.003	<0.003
28	Hexavalent Chromium (as Cr+6)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
29	Total Alkalinity (as CaCO3)	mg/L	149	134	194	160	138
30	Ammonia (as NH3-N)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
31	Sodium Absorbance Ratio	-	1.5	1.9	2.2	1.6	1.8

Unobj. – Unobjectionable

CODE	LOCATION NAME
SW6	Pond Water (Near Sarbari)
SW7	Pond Water (Near Ranipur)
SW8	Pond Water (Near Keliyasota)
SW9	Pond Water (Near Marjadpur)
SW10	Pond Water (Near Nutandi)

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TABLE-3.9.3
GROUND WATER QUALITY

Sl. No.	Parameter	Unit	CONCENTRATIONS (GW1-GW5)				
			GW1	GW2	GW3	GW4	GW5
1	Colour	Hazen unit	<5	<5	<5	<5	<5
2	Odour	-	Unobj.	Unobj.	Unobj.	Unobj.	Unobj.
3	Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity	NTU	<1	<1	<1	<1	<1
5	pH	-	6.91	7.13	7.24	7.27	7.46
6	Conductivity	µmhos/cm	752	637	695	783	881
7	Total Hardness (as CaCO ₃)	mg/L	216	190	230	276	310
8	Iron (as Fe)	mg/L	0.23	0.32	0.26	0.45	0.39
9	Chloride (as Cl)	mg/L	124	102	108	128	138
10	Residual Free Chlorine	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
11	Fluoride (as F)	mg/L	0.23	0.41	0.36	0.43	0.27
12	Total Dissolved Solids	mg/L	435	379	409	461	515
13	Calcium (as Ca)	mg/L	62	64	67	81	89
14	Magnesium (as Mg)	mg/L	15	8	16	18	22
15	Ammonia (as Total NH ₃ -N)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
16	Copper (as Cu)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
17	Manganese (as Mn)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
18	Sulphate (as SO ₄)	mg/L	18	15	18	25	30
19	Nitrate (as NO ₃)	mg/L	2.5	3.2	3.2	4.2	4.2
20	Phenol Compounds (as C ₆ H ₅ OH)	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
21	Mercury (as Hg)	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
22	Cadmium (as Cd)	mg/L	<0.003	<0.003	<0.003	<0.003	<0.003
23	Arsenic (as As)	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002
24	Lead (as Pb)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
25	Zinc (as Zn)	mg/L	<0.05	0.09	<0.05	0.11	0.15
26	Silver (as Ag)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
27	Nickel (as Ni)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
28	Hexavalent Chromium (as Cr ⁺⁶)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
29	Boron (as B)	mg/L	<0.02	<0.02	<0.02	<0.02	<0.02
30	Alkalinity (as CaCO ₃)	mg/L	211	189	215	226	254
31	Total Coliforms	MPN/100 ml	N.D.	N.D.	N.D.	N.D.	N.D.

Unobj. – Unobjectionable

N.D - Not Detected

CODE	LOCATION NAME
GW1	Near Project Site (Borewell)
GW2	Chak Atlabari (Tubewell)
GW3	Keliasota (Tubewell)
GW4	Nadiha (Tubewell)
GW5	Deilya (BoreWell)

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TABLE-3.9.3 (Continued)
GROUND WATER QUALITY

Sl. No.	Parameter	Unit	CONCENTRATIONS (GW 6-GW 9)			
			GW6	GW7	GW8	GW9
1	Colour	Hazen unit	<5	<5	<5	<5
2	Odour	-	Unobj.	Unobj.	Unobj.	Unobj.
3	Taste	-	Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity	NTU	<1	<1	<1	<1
5	pH	-	7.46	6.92	6.73	7.12
6	Conductivity	µmhos/cm	642	761	572	687
7	Total Hardness (as CaCO ₃)	mg/L	242	284	192	216
8	Iron (as Fe)	mg/L	0.41	0.41	0.35	0.31
9	Chloride (as Cl)	mg/L	102	125	89	114
10	Residual Free Chlorine	mg/L	<0.1	<0.1	<0.1	<0.1
11	Fluoride (as F)	mg/L	0.27	0.23	0.38	0.46
12	Total Dissolved Solids	mg/L	373	443	337	405
13	Calcium (as Ca)	mg/L	61	81	50	57
14	Magnesium (as Mg)	mg/L	22	20	17	18
15	Ammonia (as Total NH ₃ -N)	mg/L	<0.05	<0.05	<0.05	<0.05
16	Copper (as Cu)	mg/L	<0.05	<0.05	<0.05	<0.05
17	Manganese (as Mn)	mg/L	<0.05	<0.05	<0.05	<0.05
18	Sulphate (as SO ₄)	mg/L	19	23	12	25
19	Nitrate (as NO ₃)	mg/L	3.4	3.2	3.5	4.8
20	Phenol Compounds (as C ₆ H ₅ OH)	mg/L	<0.001	<0.001	<0.001	<0.001
21	Mercury (as Hg)	mg/L	<0.001	<0.001	<0.001	<0.001
22	Cadmium (as Cd)	mg/L	<0.003	<0.003	<0.003	<0.003
23	Arsenic (as As)	mg/L	<0.002	<0.002	<0.002	<0.002
24	Lead (as Pb)	mg/L	<0.01	<0.01	<0.01	<0.01
25	Zinc (as Zn)	mg/L	<0.05	0.09	0.1	<0.05
26	Silver (as Ag)	mg/L	<0.05	<0.05	<0.05	<0.05
27	Nickel (as Ni)	mg/L	<0.01	<0.01	<0.01	<0.01
28	Hexavalent Chromium (as Cr ⁺⁶)	mg/L	<0.05	<0.05	<0.05	<0.05
29	Boron (as B)	mg/L	<0.02	<0.02	<0.02	<0.02
30	Alkalinity (as CaCO ₃)	mg/L	190	221	177	183
31	Total Coliforms	MPN/100 ml	N.D.	N.D.	N.D.	N.D.

Unobj. – Unobjectionable

N.D - Not Detected

CODE	LOCATION NAME
GW6	Kuchahela (Tubewell)
GW7	Neturia(Borewell)
GW8	Goaladi (Tubewell)
GW9	Nutandi (Tubewell)

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Table-3.9.4 : Central Pollution Control Board (CPCB) Surface Water Quality Criteria

Sl. No.	Parameters	Class A	Class B	Class C	Class D	Class E
1	pH	6.5–8.5	6.5–8.5	6.0–9.0	6.5–8.5	6.0–8.5
2	Dissolved Oxygen (as O ₂), mg/l, min	6	5	4	4	-
3	BOD, 5 days at 20°C, max	2	3	3	-	-
4	Total Coliforms organism, MPN/100 ml, max	50	500	5000	-	-
5	Free ammonia (as N), mg/l, max	-	-	-	1.2	-
6	Electrical Conductivity, µmhos/cm, max	-	-	-	-	2250
7	Sodium Absorption Ratio, max	-	-	-	-	26
8	Boron (as B), mg/l, max	-	-	-	-	2

Class A: Drinking water source without conventional treatment but after disinfection

Class B: Outdoor bathing (organised)

Class C: Drinking water source after conventional treatment and after disinfection

Class D: Propagation of Wild life and Fisheries

Class E: Irrigation, Industrial Cooling, and Controlled Waste Disposal

Below E: Not meeting A, B, C, D & E Criteria

Designated Best Use Water Quality Criteria

Designated-Best-Use	Class of water	Criteria
Drinking Water Source without conventional treatment but after disinfection	A	Total Coliforms Organism MPN/100ml shall be 50 or less pH between 6.5 and 8.5 Dissolved Oxygen 6mg/l or more Biochemical Oxygen Demand 5 days 20C 2mg/l or less
Outdoor bathing (Organised)	B	Total Coliforms Organism MPN/100ml shall be 500 or less pH between 6.5 and 8.5 Dissolved Oxygen 5mg/l or more Biochemical Oxygen Demand 5 days 20C 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	Total Coliforms Organism MPN/100ml shall be 5000 or less pH between 6 to 9 Dissolved Oxygen 4mg/l or more Biochemical Oxygen Demand 5 days 20C 3mg/l or less
Propagation of Wild life and Fisheries	D	pH between 6.5 to 8.5 Dissolved Oxygen 4mg/l or more Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	pH between 6.0 to 8.5 Electrical Conductivity at 25C micro mhos/cm Max. 2250 Sodium absorption Ratio Max. 26 Boron Max. 2mg/l

Source: https://cpcb.nic.in/wqm/Designated_Best_Use_Water_Quality_Criteria.pdf

CONCLUSION FROM SURFACE WATER ANALYSIS

As per CPCB norms of classification of surface water,

- (a) The Panchet Dam water quality (SW1) parameters are within the standard for Class C i.e., Drinking water source after conventional treatment and after disinfection.

Damodar river water quality (**SW2 & SW3**) parameters are within the standard for Class C i.e., Drinking water source after conventional treatment and after disinfection.

- (b) The Pond water quality (**SW3 to SW9**) parameters are within the standard for Class C except for BOD levels the values are 4 mg/l to 8 mg/l respectively, which is more than the standard (3 mg/l). Hence, this water is suitable for “Propagation of Wildlife & Fisheries” (i.e., Class D).

IS 10500:2012 LIMITS

Sl. No.	Parameter	Unit	Acceptable Limit of IS:10500:2012	Permissible limit of IS:10500:2012
1	Colour	Hazen unit	5	15
2	Odour		Agreeable	Agreeable
3	Taste		Agreeable	Agreeable
4	Turbidity	NTU	1	5
5	pH	-	6.5 – 8.5	No relaxation
6	Temperature	⁰ C	-	-
7	Conductivity	μS/cm	-	-
8	Free Residual Chlorine	mg/L	0.2	1
9	Total Dissolved Solids	mg/L	500	2000
10	Phenol (as C ₆ H ₅ OH)	mg/L	0.001	No relaxation
11	Total Hardness (as CaCO ₃)	mg/L	200	600
12	Total Alkalinity (as CaCO ₃)	mg/L	200	600
13	Chloride (as Cl)	mg/L	250	1000
14	Sulphate (as SO ₄)	mg/L	200	400
15	Nitrate (as NO ₃)	mg/L	45	No relaxation
16	Fluoride (as F)	mg/L	1	1.5
17	Calcium (as Ca)	mg/L	75	200
18	Magnesium (as Mg)	mg/L	30	100
19	Ammonia (as Total NH ₃ -N)	mg/L	0.5	No relaxation
20	Boron (as B)	mg/L	0.5	2.4
21	Chromium (as Cr)	mg/L	0.05	No relaxation
22	Copper (as Cu)	mg/L	0.05	1.5
23	Manganese (as Mn)	mg/L	0.1	0.3
24	Zinc (as Zn)	mg/L	5	15

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25	Cadmium (as Cd)	mg/L	0.003	No relaxation
26	Iron (as Fe)	mg/L	1	No relaxation
27	Lead (as Pb)	mg/L	0.01	No relaxation
28	Silver (as Ag)	mg/L	0.1	No relaxation
29	Nickel (as Ni)	mg/L	0.02	No relaxation
30	Arsenic (as As)	ppb	10	No relaxation
31	Mercury (as Hg)	ppb	1	No relaxation
32	Total Coliforms	MPN/ 100 ml	Shall not be detectable in any 100 ml sample	Shall not be detectable in any 100 ml sample

CONCLUSION FROM GROUND WATER SAMPLE ANALYSIS

Ground water physico-chemical properties in the study area showed that the water strata mainly from Bicarbonate buffer system has appreciable amount of alkalinity & Hardness. Calcium & Magnesium which are beneficial for human health are found satisfactory. The other parameters (i.e. Sulphate, Chloride etc.) fall within satisfactory level. While comparing with IS 10500:2012, it can be concluded that all ground water samples are within permissible limit & can be used as drinking water source.

The plant will be based on Zero Liquid Discharge (ZLD) Concept. Therefore, the sources of water including ground water will not be affected during the operational phase.

3.10 NOISE

Noise has been defined as unwanted sound, a potential hazard to health of the human beings; it may cause irritation and discomfort. There are several sources of noise. It is always higher in urban and industrial areas than that at the rural area. Industries expose their workers to high noise level for long period.

A total of Ten (10) locations within an area of 10 km radius around the project site have been selected for measurement of ambient noise levels. These locations with their geographical co-ordinates have been displayed in **Table-3.10.1** and pictorially presented in **Figure-3.10.1**.

3.10.1 MAJOR SOURCES OF NOISE IN THE STUDY AREA

The study area is of both industrial & residential in nature. Vehicular movement on the roads is a source of noise in those residential & industrial areas. This increases the ambient noise levels. There are also a number of other domestic noise sources such as television, radio, loud speakers, etc.

3.10.2 AMBIENT NOISE MONITORING

In the present study, a sound level meter has measured sound pressure levels. Since loudness of sound is important for its effects on people, the dependence of loudness on frequency must be taken into account in environmental noise assessment. This has been achieved by using A-weighting filters in the noise measuring instrument which gives a direct reading of approximate loudness. Moreover, A-weighted equivalent continuous sound pressure level (L_{eq}) values have been computed from the values of A-weighted sound pressure level (SPL) measured with the help of a noise meter.

At each location, readings were taken at uniform interval over a twenty-four hours period, divided into day and night shifts. For a particular location daytime L_{eq} has been computed from the SPL values measured between 6.00 A.M to 10.00 P.M and night time L_{eq} from the SPL values measured between 10.00 P.M to 6.00 A.M, such that comparison could be made with the National Ambient Noise Standards.

3.10.3 NOISE LEVELS IN THE STUDY AREA

The noise levels were monitored at 10 (Ten) locations. Monitoring was done, covering both day and night time. Noise levels in L_{eq} at the respective locations separately for Day and Night times have been presented in **Table-3.10.2**.

During the day time, the equivalent noise levels were found to vary in the range of (54.1 - 65.1) dB (A) while in the night time, the equivalent noise levels were observed to be varying in the range of (43.3 - 56.1) dB (A).

As usual, the day time noise levels were found to be higher than those, observed at night level.

TABLE-3.10.1
LOCATIONS OF NOISE LEVEL MONITORING IN THE STUDY AREA

SL. NO.	LOCATIONS	LATITUDE	LONGITUDE
1.	Project Site	23°39'27.21"N	86°47'51.48"E
2.	Near Ispat Damodar	23°39'6.54"N	86°47'38.92"E
3.	Near Apodictic Ceramic Pvt. Ltd.	23°39'21.63"N	86°46'48.99"E
4.	Ranipur Primary School	23°40'8.12"N	86°48'0.58"E
5.	Panchkot Mahavidyalaya	23°38'51.42"N	86°49'4.25"E
6.	Bhamuria S.M.(H.S.) High School	23°39'23.63"N	86°50'8.73"E
7.	Nutandih village	23°38'11.38"N	86°47'11.88"E
8.	Narayanpur Village	23°40'27.11"N	86°47'5.72"E
9.	Nadiha Village	23°39'50.41"N	86°46'23.94"E
10.	Tiltorya, Pochhyara Village	23°38'46.58"N	86°46'37.68"E



FIGURE-3.10.1
NOISE LEVEL MONITORING LOCATIONS

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TABLE – 3.10.2
Equivalent Noise Level in the Study Area, Leq in dB(A)

SL. NO.	CODE NO.	NAME OF LOCATIONS	CATEGORY	EQUIVALENT NOISE LEVEL (Leq in dB(A))	
				DAY	NIGHT
1	N1	Project Site	Industrial Area	64.8	55.2
2	N2	Near Ispat Damodar	Industrial Area	65.1	54.6
3	N3	Near Apodictic Ceramic Pvt. Ltd.	Industrial Area	64.5	56.1
4	N4	Ranipur Primary School	Silence Zone	55.2	44.2
5	N5	Panchkot Mahavidyalaya	Silence Zone	56.1	43.6
6	N6	Near ECL Hospital	Silence Zone	55.1	43.3
7	N7	Nutandih village	Residential Area	56.6	46.5
8	N8	Narayanpur Village	Residential Area	57.2	44.9
9	N9	Keliasota Village	Residential Area	54.1	46.5
10	N10	Chak Atlabari Village	Residential Area	57.6	45.2
N.B.: Day time is reckoned between 06:00 HOURS TO 2200 HOURS					
Night Time is reckoned between 22:00 HOURS TO 0600 HOURS					

National Noise Standard

Category of Area	Limits in dB(A) Leq*	
	Day Time	Night Time
Industrial Area	75	70
Commercial Area	65	55
Residential Area	55	45
Silence Zone	50	40

3.10.4 CONCLUSION:

The Equivalent Noise Levels in the Industrial locations are within permissible limits. However, the noise level has exceeded the permissible limits for Residential and Silence locations in the study area. Such high noise levels may be attributed mainly to the noise, generated due to the vehicular traffic.

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3.11 ECOLOGY

3.11.1 INTRODUCTION

The concept of ecology has been increasingly used as conceptual focus for conservation policy and to measure species extinction and ecosystem loss in response to natural and human induced selection pressures. Natural flora and fauna is an integral component of Eco-system and is a good indicator of environmental quality of the habitat. Different communities present in it show different degree of responses and sensitiveness to physical (biotic) influences. Therefore, any environmental analysis where integration of ecological thoughts into planning process is required, the analysis of biological status of the area is very important to project possible deterioration in natural environment on account of Industrial development in the area and designing suitable management corrective action plan.

In addition to the field study, literature review/desk research was carried out to determine the existing conditions within the study area and to identify habitats and species of potential importance that may be affected by the expansion project.

The following parameters were primarily considered in the study:

- To assess the nature and distribution of vegetation in and around the project site within the 10 km radius study area;
- To assess the biodiversity of natural system present in the study area;
- Identification of important plants/animal species having diverse economic values;
- Identification of rare endangered plants and animal species (if any);
- Collection of data from literature about the floral and faunal accounts.

3.11.2 BIOLOGICAL ASPECT

The study on biological aspect is important for Environmental Impact Assessment in view of conservation of environmental quality and safety of natural flora and fauna. A biological community being dependent on the condition and resources of its location may change if there is a little change in the ecosystem. Such a community change is a reflection of changes in the plant and animal population that comprises of the community because of the complex interrelationships of a changing condition of resources that causes one or more of the population to change may cause many populations to change and be replaced by

others. Since the environment of organisms are able to inhabit that location, the inhabitants should be biological inducers of environmental changes.

3.11.3 CLASSIFICATION OF RECORDED FOREST LAND

Reserved Forest: An area notified under the provisions of Indian Forest Act, 1927 is having full protection. In Reserved Forest, all activities are prohibited unless permitted specifically (Sec.20 of IFA, 1927).

Protected Forest: An area notified under the provisions of the Indian Forest Act having limited degree of protection. In Protected Forest all activities are permitted unless prohibited (Sec. 29 of IFA, 1927).

Unclassified State Forest: It is defined as an area recorded as forest but not included in Reserved or Protected forest category. Ownership status of such forests differs from state to state.

TABLE-3.11.1
CLASSIFICATION OF FOREST AREAS IN PURULIA DISTRICT

Sl. No.	Class of Forest	Areas in Hectares
1	Reserved Forest	10435.62
2	Protected Forest	56184.66
3	Unclassified State Forest	34015.01
4	Khas Forest	14686.65
5	Forest owned by private individuals	850.00
Total		116171.94

(Source: West Bengal Forest Department)

3.11.4 Description of the study area

The study area is primarily agricultural in nature. The periphery of the study area is basically rural in nature. The major surface water bodies in the study area are the Panchet Dam (Reservoir), Damodar River, Barakar River and Khudia River. The River Damodar is mainly perennial in nature, which means it has sufficient water to flow all around the year. The nearest distance of the Damodar River is 2.4 Km from the Project Site. River Barakar is the main tributary of the River Damodar. River Barakar meets with the River Damodar at Fatepur. Khudia River is the main tributary of the River Barakar. The confluence point of the River Barakar and the river Khudia is at Hatinal.

Ecological study was carried out considering the 10 km radius of the proposed project site. Sampling was done on random basis. Trees, shrubs, herbs and climbers, amphibians, reptiles, birds, mammals,

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fishes, etc. were considered separately and their distribution in the above mentioned study area was represented separately.

3.11.5 RECONNAISSANCE SURVEY

A reconnaissance survey was undertaken in 10 km radius study area around the proposed project site. Through initial rapid extensive field survey at the selected sampling locations, flora-fauna checklists were prepared by the survey team members. The field study was undertaken once during the study period (March, 2023 to May, 2023).

3.11.6 METHODOLOGY OF ECOLOGICAL STUDY

Different methods which have been adopted for ecological study in the study area are as follows:

- Inventorisation of flora/fauna: The list of flora and fauna found in the region was prepared by conducting field survey and by discussions with concerned Forest Department personnel using the list available in the Working Plan as a base.
- Generation of primary data through systematic ecological studies: The phyto-sociology of the vegetation (covering frequency, density, abundance and species diversity) in the forest areas falling in the study area was determined by conducting field studies in selected areas (by laying suitable sizes of Quadrat).
- Discussion with local people so as to elicit information about local plant and animals.

The ecological status of the study area has been divided into mainly two categories: Terrestrial Ecology and Aquatic Ecology.

3.11.7 Terrestrial Ecology

During the ecological study the following common natural tree species has identified in the study area and tabulated in **Table 3.11.2**. The natural trees are combination of both deciduous and evergreen plants mixed with some exotic species.

3.11.7.1 Terrestrial Flora

The natural vegetation of the area may be broadly noted with few natural vegetation and roadside social plantation and avenue trees in the villages. The bio-diversity of such naturally growing plant species would indicate environmental quality and surveyed intensively.

Vegetation of a particular area depends upon the interaction of various natural factors including plants, animals, microorganisms of that particular area in which they grow, live and influence one another.

Natural tree species was analyzed and calculated by Quadrat method at different places in the study area like just beside of the project site; various places in the Garh Panchkot Hill/ Panchet Forest, Garangi Hill, Roadside Patches, and domestic land etc.

A checklist of natural tree species has been given in **Table-3.11.2** and composite Quadrat analysis & Biodiversity Index of those species have been calculated and tabulated in **Table-3.11.3** and **Table-3.11.4**.

There are also several natural species of shrubs, herbs and climbers observed within the study area. A checklist of these species of shrubs has been shown in **Table-3.11.5** and a checklist of these species of herbs and climbers has been shown in **Table-3.11.6**. A list of fern species in the study area has been shown in **Table-3.11.7**. A list of useful plant species in the study area has been shown in **Table-3.11.8**.

The following survey was undertaken in the study area during field trips:

- (I) **Forest/Vegetation composition analysis:** Recording and its detail phyto-sociological analysis was done by the following quadrat (10m x 10m) method.

The following parameters were primarily considered in the study and computed in the following way:

- (i) **Frequency:** The degree of dispersion of individual species in an area is called frequency. It is express as percentage occurrence.

$$\text{Frequency (f)} = \frac{\text{Number of quadrates in which a species occurs}}{\text{Total number of quadrates sampled}} \times 100$$

- (ii) **Abundance:** This is the study of number of individual of different species in community per unit area.

$$\text{Abundance (A)} = \frac{\text{Total No. of individuals of a species in all quadrate}}{\text{Total number of quadrates in which the species occurs}}$$

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(iii) Relative Abundance: It is the determination of the percentage of individual of one genera in composition to the total of all individual as a given area.

$$\text{Relative Abundance (A)} = \frac{\text{Total No. of individuals species in the sample}}{\text{Number of quadrat in which a species occurs}}$$

$$\text{Density (D)} = \frac{\text{Total No. of individuals of a species in all quadrates}}{\text{Total No. of quadrat sampled}}$$

(II) Species Diversity Index: species diversity in a biological community is based on presence of a wide variety of species. It is in expressed by **Shannon-Weiner Index** (1948) in the following way:

$$H = \sum_{i=1}^s -(P_i \times \ln P_i)$$

Where,

H = Species diversity index

S = the number of species in a sample

P_i = (n_i/N)

N = the total number of individuals of all the species in a sample

n_i = the number of individuals of a species.

TABLE-3.11.2
CHECKLIST OF MOST COMMON TREE SPECIES

Sl. No.	Scientific Name	Common Name	Family
1.	<i>Mangifera indica</i>	Mango	Anacardiaceae
2.	<i>Anacardium occidentale</i>	Cashew nut	Anacardiaceae
3.	<i>Nephelium litchi</i>	Litchi	Anacardiaceae
4.	<i>Bombax malabaricum</i>	Red Silk Cotton Tree	Bombacaceae
5.	<i>Eridendron infractuosum</i>	White Silk Cotton Tree	Bombacaceae
6.	<i>Cassia fistula</i>	Indian Laburnum	Caesalpiniae
7.	<i>Delonix regia</i>	Gulmohar	Caesalpiniae
8.	<i>Tamarindus indica</i>	Tamarind	Caesalpiniae
9.	<i>Saraca indica</i>	Ashok	Caesalpiniae
10.	<i>Bauhinia accuminata</i>	Camel's foot tree	Caesalpiniae
11.	<i>Peltophorum inerme</i>	Radhachura	Caesalpiniae
12.	<i>Cassia siamea</i>	Chakunda	Caesalpiniae
13.	<i>Casuarina equisetifolia</i>	Jhau	Casuarinaceae
14.	<i>Trewia nudiflora</i>	Pituli	Euphorbiaceae
15.	<i>Tamarix dioeca</i>	Nona Jhau	Euphorbaceae
16.	<i>Exocaria agalocha</i>	Geanoa	Euphorbaceae
17.	<i>Erythrina indica</i>	Coraltree	Fabaceae
18.	<i>Sesbania grandiflora</i>	Bakful	Fabaceae
19.	<i>Dalbergia sisso</i>	Sisso	Fabaceae
20.	<i>Pongamia glabra</i>	Karang	Fabaceae
21.	<i>Gliricidea sepium</i>	-	Fabaceae
22.	<i>Acacia auriculiformis</i>	Akasmoni	Mimosiae
23.	<i>A. nilotica</i>	Babul	Mimosiae
24.	<i>Albizzia lebbeck</i>	Siris	Mimosiae
25.	<i>Pithecolobium dulce</i>	Manila tamarind	Mimosiae
26.	<i>Samanea saman</i>	Rain tree	Mimosiae
27.	<i>Ficus bengalensis</i>	Banyan	Moraceae
28.	<i>Ficus religiosa</i>	Peepal	Moraceae
29.	<i>Ficus cunia</i>	Fig tree	Moraceae
30.	<i>Ficus elastica</i>	India Rubber	Moraceae
31.	<i>Artocarpus integrifolia</i>	Jackfruit	Moraceae
32.	<i>Morus indica</i>	Mulbery	Moraceae
33.	<i>Syzizium jambos</i>	Jam	Myrtaceae
34.	<i>Callistemon speciosus</i>	Bottle brush tree	Myrtaceae
35.	<i>Eucalyptus globulus</i>	Eucalyptus	Myrtaceae
36.	<i>Cocos nucifera</i>	Coconut palm	Palmae
37.	<i>Phoenix sylvestris</i>	Date palm	Palmae
38.	<i>Borassus flabellifer</i>	Plamyra palm	Palmae
39.	<i>Areca catechu</i>	Betelnut palm	Palmae
40.	<i>Trema orientalis</i>	Jiban	Urticaceae

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Sl. No.	Scientific Name	Common Name	Family
41.	<i>Holoptelea integrifolia</i>	Indian Elm	Urticaceae
42.	<i>Michella champaca</i>	Champak	Magnoliaceae
43.	<i>Polyalthia longifolia</i>	Debdaru	Anonaceae
44.	<i>Aegle marmelos</i>	Wood apple	Rutaceae
45.	<i>Feronia elephantum</i>	Elephant apple	Rutaceae
46.	<i>Azadirachta indica</i>	Neem	Meliaceae
47.	<i>Swetenia mahogini</i>	Mahogany	Meliaceae
48.	<i>Trewia nudiflora</i>	Pituli	Euphorbiaceae
49.	<i>Grewia asiatica</i>	Phalsa	Tiliaceae
50.	<i>Thespesia populnea</i>	Tulip tree	Malvaceae
51.	<i>Pterospermum acerifolium</i>	Muchkund	Sterculiaceae
52.	<i>Calophyllum inophyllum</i>	Sultan Champa	Guttiferae
53.	<i>Lagerstroemia flosreginae</i>	Jarul	Lythraceae
54.	<i>Terminalia catappa</i>	Indian Alamond	Combretaceae
55.	<i>Terminalia arjuna</i>	Arjun	Combretaceae
56.	<i>Mimusops elengi</i>	Bakul	Zapotaceae
57.	<i>Plumeria acutifolia</i>	Pagoda tree	Apocynaceae
58.	<i>Holarrhena antidysenterica</i>	Kurchi	Apocynaceae
59.	<i>Morinda citrifolia</i>	Hurdi	Rubiaceae
60.	<i>Anthocephalus chinensis</i>	Kadam	Rubiaceae
61.	<i>Adina cordifolia</i>	Haldu	Rubiaceae
62.	<i>Leucaenea leucocephala</i>	Subabul	Mimosae
63.	<i>Gravelia robusta</i>	Silver fir	Proteaceae
64.	<i>Spathodea campanulata</i>	Rudrapalash	Bignoniaceae
65.	<i>Putranjiva roxburghii</i>	Putranjiva	Euphorbiaceae
66.	<i>Alstonia scholaris</i>	Chatim	Apocyanaceae
67.	<i>Mellingtonia hortensis</i>	Indian cork tree	Bignoniaceae
68.	<i>Sizigium jambos</i>	Jamrul	Myrtaceae
69.	<i>Dalenia indica</i>	Chalta	Doleniaceae
70.	<i>Acras sapota</i>	Sapeda	Zapotaceae
71.	<i>Moringa pterigospermum</i>	Sajina	Moringaceae
72.	<i>Psidium guajava</i>	Guava	Myrtaceae
73.	<i>Sonnaratia apetala</i>	Keora	Combretaceae
74.	<i>Gmelina arborea</i>	Gamar	Verbanaceae
75.	<i>Tectona grandis</i>	Teak	Verbanaceae

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TABLE - 3.11.3
QUANTITATIVE ASSESSMENT
(BY QUADRAT METHOD) OF TREE SPECIES IN THE STUDY AREA
(Note: Each column of Quadrat Number represents 1 Quadrat of 10m × 10m Size)

Sl. No.	Name of Trees	Quadrat No.										Total	Frequency	Density	Abundance
		1	2	3	4	5	6	7	8	9	10				
1	<i>Mangifera indica</i>	1		2		1	1			2		7	50	0.7	140.00
2	<i>Anacardium occidentale</i>		1						1			2	20	0.2	100.00
3	<i>Nephelium litchi</i>				1			1				2	20	0.2	100.00
4	<i>Bombax malabaricum</i>	1					1				1	3	30	0.3	100.00
5	<i>Eridendron infractuosum</i>		1		1				1			3	30	0.3	100.00
6	<i>Cassia fistula</i>	1				2				1		4	30	0.4	133.33
7	<i>Delonix regia</i>		1					1				2	20	0.2	100.00
8	<i>Tamarindus indica</i>			1			1				1	3	30	0.3	100.00
9	<i>Saraca indica</i>	1										1	10	0.1	100.00
10	<i>Bauhinia accuminata</i>							1				1	10	0.1	100.00
11	<i>Peltophorum inerme</i>					1						1	10	0.1	100.00
12	<i>Cassia siamea</i>			1							1	2	20	0.2	100.00
13	<i>Casuarina equisetifolia</i>							2				2	10	0.2	200.00
14	<i>Trewia nudiflora</i>	1										1	10	0.1	100.00
15	<i>Tamarix dioeca</i>					2						2	10	0.2	200.00
16	<i>Exocaria agalocha</i>					1			1			2	20	0.2	100.00
17	<i>Erythrina indica</i>		1									1	10	0.1	100.00
18	<i>Sesbania grandiflora</i>	2										2	10	0.2	200.00
19	<i>Dalbergia sisso</i>								1		1	2	20	0.2	100.00
20	<i>Pongamia glabra</i>				1							1	10	0.1	100.00
21	<i>Gliricidea sepium</i>	1										1	10	0.1	100.00
22	<i>Acacia auriculiformis</i>				2			1				3	20	0.3	150.00
23	<i>A. nilotica</i>			1						1		2	20	0.2	100.00
24	<i>Albizzia lebeck</i>						2					2	10	0.2	200.00
25	<i>Pithecolobium dulce</i>	1									2	3	20	0.3	150.00
26	<i>Samanea saman</i>					1			1			2	20	0.2	100.00
27	<i>Ficus bengalensis</i>		1									1	10	0.1	100.00
28	<i>Ficus religiosa</i>							2				2	10	0.2	200.00
29	<i>Ficus cunia</i>	1				1						2	20	0.2	100.00
30	<i>Ficus elastica</i>			1		1			1			3	30	0.3	100.00
31	<i>Artocarpus integrifolia</i>	1										1	10	0.1	100.00
32	<i>Morus indica</i>						1					1	10	0.1	100.00
33	<i>Syzizium jambos</i>										1	1	10	0.1	100.00
34	<i>Callistemon speciosus</i>		1									1	10	0.1	100.00
35	<i>Eucalyptus globulus</i>							1				1	10	0.1	100.00

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Sl. No.	Name of Trees	Quadrat No.										Total	Frequency	Density	Abundance
		1	2	3	4	5	6	7	8	9	10				
36	<i>Cocos nucifera</i>	1		3		1				2		7	40	0.7	175.00
37	<i>Phoenix sylvestris</i>				2				1			3	20	0.3	150.00
38	<i>Borassus flabellifer</i>			1								1	10	0.1	100.00
39	<i>Areca catechu</i>										1	1	10	0.1	100.00
40	<i>Trema orientalis</i>	1										1	10	0.1	100.00
41	<i>Holoptelea integrifolia</i>							2				2	10	0.2	200.00
42	<i>Michella champaca</i>				2							2	10	0.2	200.00
43	<i>Polyalthia longifolia</i>		1						1			2	20	0.2	100.00
44	<i>Aegle marmelos</i>										1	1	10	0.1	100.00
45	<i>Feronia elephantum</i>			1				2				3	20	0.3	150.00
46	<i>Azadirachta indica</i>						1					1	10	0.1	100.00
47	<i>Swetenia mahogini</i>		2							1		3	10	0.3	300.00
48	<i>Trewia nudiflora</i>							1				1	10	0.1	100.00
49	<i>Grewia asiatica</i>	1										1	10	0.1	100.00
50	<i>Thespesia populnea</i>					1						1	10	0.1	100.00
51	<i>Pterospermum acerifolium</i>								1			1	10	0.1	100.00
52	<i>Calophyllum inophyllum</i>			2								2	10	0.2	200.00
53	<i>Lagerstroemia flosreginae</i>										1	1	10	0.1	100.00
54	<i>Terminalia catappa</i>	1				1			1			3	30	0.3	100.00
55	<i>Terminalia arjuna</i>							1				1	10	0.1	100.00
56	<i>Mimusops elengi</i>			1								1	10	0.1	100.00
57	<i>Plumeria acutifolia</i>							1				1	10	0.1	100.00
58	<i>Holarrhena antidysenterica</i>								2			2	10	0.2	200.00
59	<i>Morinda citrifolia</i>		2									2	10	0.2	200.00
60	<i>Anthocephalus chinensis</i>						1					1	10	0.1	100.00
61	<i>Adina cordifolia</i>			1								1	10	0.1	100.00
62	<i>Leucaenea leucocephala</i>							2				2	10	0.2	200.00
63	<i>Gravelia robusta</i>		1									1	10	0.1	100.00
64	<i>Spathodia campanulata</i>	1			2							3	20	0.3	150.00
65	<i>Putranjiba roxburghii</i>										1	1	10	0.1	100.00
66	<i>Alstonia scholaris</i>										1	1	10	0.1	100.00
67	<i>Mellingtonia hortensis</i>						2					2	10	0.2	200.00
68	<i>Sizigium jambos</i>	1										1	10	0.1	100.00
69	<i>Dalenia indica</i>									1		1	10	0.1	100.00

Sl. No.	Name of Trees	Quadrat No.										Total	Frequency	Density	Abundance
		1	2	3	4	5	6	7	8	9	10				
70	<i>Acras sapota</i>							1				1	10	0.1	100.00
71	<i>Moringa pterigospermum</i>					1			1			2	20	0.2	100.00
72	<i>Psidium guajava</i>									2		2	10	0.2	200.00
73	<i>Sonnaratia apetala</i>			2								2	10	0.2	200.00
74	<i>Gmelina arborea</i>									1		1	10	0.1	100.00
75	<i>Tectona grandis</i>								1			1	10	0.1	100.00
	Total	17	12	17	11	14	10	19	14	11	12	137	1100	13.7	9498.33

TABLE – 3.11.4
BIODIVERSITY INDEX OF TREE SPECIES

Sl. No.	Name of Trees	Total No. (ni)	Abundance (N)	Pi=(ni/N)	Shannon Index (Pi x lnPi)
1	<i>Mangifera indica</i>	7	140.00	0.05	0.15
2	<i>Anacardium occidentale</i>	2	100.00	0.02	0.08
3	<i>Nephelium litchi</i>	2	100.00	0.02	0.08
4	<i>Bombax malabaricum</i>	3	100.00	0.03	0.11
5	<i>Eridendron infractuosum</i>	3	100.00	0.03	0.11
6	<i>Cassia fistula</i>	4	133.33	0.03	0.11
7	<i>Delonix regia</i>	2	100.00	0.02	0.08
8	<i>Tamarindus indica</i>	3	100.00	0.03	0.11
9	<i>Saraca indica</i>	1	100.00	0.01	0.05
10	<i>Bauhinia acuminate</i>	1	100.00	0.01	0.05
11	<i>Peltophorum inerme</i>	1	100.00	0.01	0.05
12	<i>Cassia siamea</i>	2	100.00	0.02	0.08
13	<i>Casuarina equisetifolia</i>	2	200.00	0.01	0.05
14	<i>Trewia nudiflora</i>	1	100.00	0.01	0.05
15	<i>Tamarix dioeca</i>	2	200.00	0.01	0.05
16	<i>Exocaria agalocha</i>	2	100.00	0.02	0.08
17	<i>Erythrina indica</i>	1	100.00	0.01	0.05
18	<i>Sesbania grandiflora</i>	2	200.00	0.01	0.05
19	<i>Dalbergia sisso</i>	2	100.00	0.02	0.08
20	<i>Pongamia glabra</i>	1	100.00	0.01	0.05
21	<i>Gliricidea sepium</i>	1	100.00	0.01	0.05
22	<i>Acacia auriculiformis</i>	3	150.00	0.02	0.08
23	<i>A. nilotica</i>	2	100.00	0.02	0.08
24	<i>Albizia lebbeck</i>	2	200.00	0.01	0.05
25	<i>Pithecolobium dulce</i>	3	150.00	0.02	0.08
26	<i>Samanea saman</i>	2	100.00	0.02	0.08
27	<i>Ficus bengalensis</i>	1	100.00	0.01	0.05

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28	<i>Ficus religiosa</i>	2	200.00	0.01	0.05
29	<i>Ficus cunia</i>	2	100.00	0.02	0.08
30	<i>Ficus elastica</i>	3	100.00	0.03	0.11
31	<i>Artocarpus integrifolia</i>	1	100.00	0.01	0.05
32	<i>Morus indica</i>	1	100.00	0.01	0.05
33	<i>Syzizium jambos</i>	1	100.00	0.01	0.05
34	<i>Callistemon speciosus</i>	1	100.00	0.01	0.05
35	<i>Eucalyptus globulus</i>	1	100.00	0.01	0.05
36	<i>Cocos nucifera</i>	7	175.00	0.04	0.13
37	<i>Phoenix sylvestris</i>	3	150.00	0.02	0.08
38	<i>Borassus flabellifer</i>	1	100.00	0.01	0.05
39	<i>Areca catechu</i>	1	100.00	0.01	0.05
40	<i>Trema orientalis</i>	1	100.00	0.01	0.05
41	<i>Holoptelea integrifolia</i>	2	200.00	0.01	0.05
42	<i>Michella champaca</i>	2	200.00	0.01	0.05
43	<i>Polyalthia longifolia</i>	2	100.00	0.02	0.08
44	<i>Aegle marmelos</i>	1	100.00	0.01	0.05
45	<i>Feronia elephantum</i>	3	150.00	0.02	0.08
46	<i>Azadirachta indica</i>	1	100.00	0.01	0.05
47	<i>Swetenia mahogini</i>	3	300.00	0.01	0.05
48	<i>Trewia nudiflora</i>	1	100.00	0.01	0.05
49	<i>Grewia asiatica</i>	1	100.00	0.01	0.05
50	<i>Thespesia populnea</i>	1	100.00	0.01	0.05
51	<i>Pterospermum acerifolium</i>	1	100.00	0.01	0.05
52	<i>Calophyllum inophyllum</i>	2	200.00	0.01	0.05
53	<i>Lagerstroemia flosreginae</i>	1	100.00	0.01	0.05
54	<i>Terminalla catappa</i>	3	100.00	0.03	0.11
55	<i>Terminalia arjuna</i>	1	100.00	0.01	0.05
56	<i>Mimusops elengi</i>	1	100.00	0.01	0.05
57	<i>Plumeria acutifolia</i>	1	100.00	0.01	0.05
58	<i>Holarrhena antidysenterica</i>	2	200.00	0.01	0.05
59	<i>Morinda citrifolia</i>	2	200.00	0.01	0.05
60	<i>Anthocephalus chinensis</i>	1	100.00	0.01	0.05
61	<i>Adina cordifolia</i>	1	100.00	0.01	0.05
62	<i>Leucaenea leucocephala</i>	2	200.00	0.01	0.05
63	<i>Gravelia robusta</i>	1	100.00	0.01	0.05
64	<i>Spathodia campanulata</i>	3	150.00	0.02	0.08
65	<i>Putranjiba roxburghii</i>	1	100.00	0.01	0.05
66	<i>Alstonia scholaris</i>	1	100.00	0.01	0.05

67	<i>Mellingtonia hortensis</i>	2	200.00	0.01	0.05
68	<i>Sizigium jambos</i>	1	100.00	0.01	0.05
69	<i>Dalania indica</i>	1	100.00	0.01	0.05
70	<i>Acras sapota</i>	1	100.00	0.01	0.05
71	<i>Moringa pterigospermum</i>	2	100.00	0.02	0.08
72	<i>Psidium guajava</i>	2	200.00	0.01	0.05
73	<i>Sonnaratia apetala</i>	2	200.00	0.01	0.05
74	<i>Gmelina arborea</i>	1	100.00	0.01	0.05
75	<i>Tectona grandis</i>	1	100.00	0.01	0.05
	Total	137	9498.33	1.10	4.51
BIODIVERSITY INDEX: Shannon – Weiner Index = 4.51					

CONCLUSION:

By 4.51 value of Shannon Wiener index reported during the present study, it can be concluded that qualitatively vegetation of the project site is quite diverse (75 species). Quantitatively, the frequency (10 to 50), abundance (100 to 300) and density (0.1 to 0.7) of various types of plants indicated a high degree of evenness. Thus, the proposed project site has very rich biodiversity, which must be conserved.

Table-3.11.5
CHECKLIST OF SHRUBS IN THE STUDY AREA

Sl. No.	Scientific Name	Common Name	Family
1.	<i>Adhatoda vasica</i>	Basaka	Acanthaceae
2.	<i>Barleria prionitis</i>	Kantajhinti	Acanthaceae
3.	<i>Nyctanthas arbortristis</i>	Siuli	Apocyanaceae
4.	<i>Anona squamosa</i>	Custard apple	Anonaceae
5.	<i>Calotropis procera</i>	Akando	Asclepiadaceae
6.	<i>Eupatorium odoratum</i>	Siam Weed	Compositae
7.	<i>Ricinus communis</i>	Castorbean	Euphorbiaceae
8.	<i>Cestrum diurnum</i>	Day jasmine	Solanaceae
9.	<i>Datura metel</i>	Dhutura	Solanaceae
10.	<i>Solanum suratensis</i>	Solanum	Solanaceae
11.	<i>Ixora coccinea</i>	Rangan	Rubiaceae
12.	<i>Zizyphus oenoplia</i>	Kul	Rhamnaceae
13.	<i>Hyptis suaveolens</i>	Bantulsi	Labiatae
14.	<i>Leonurus sibiricus</i>	Mother wort	Labiatae
15.	<i>Tecoma stans</i>	Yellow bells	
16.	<i>Abutilon indicum</i>	Indian Mallow	Malvaceae

17.	<i>Malachra capitata</i>	Ban bhindi	Malvaceae
18.	<i>Urena lobata</i>	Bana okara	Malvaceae
19.	<i>Hibiscus sabdariffa</i>	Chukar	Malvaceae
20.	<i>Glycosmis pentaphylla</i>	Ash-sheora	Rutaceae
21.	<i>Murraya exotica</i>	Kamini	Rutaceae
22.	<i>Crotalaria alata</i>	Bandar lathi	Fabaceae
23.	<i>Capparis spinosa</i>	Kabra	Capparidaceae
24.	<i>Ipomea lacunosa</i>	White morning-glory	Convolvulaceae
24.	<i>Bougenvalia spectabilis</i>	Baganbilas	Nyctaginaceae
25.	<i>Pluchea indica</i>	Camphorweed	Compositae
26.	<i>Phyllanthus emblicus</i>	Amlaki	Euphorbaceae
27.	<i>Lippia geminata</i>	Bushy mat grass	Verbanaceae
28.	<i>Euphorbia trilobata</i>	Spurge	Euphorbaceae
29.	<i>Opuntia delini</i>	Prickly pear	Opantiaceae
30.	<i>Acanthus ilicifolius</i>	Hargoza	Acanthaceae
31.	<i>Ipomea fistulosa</i>	Morning Glory	Convolvulaceae
32.	<i>Jatropha gossypifolia</i>	Lal bherenda	Euphorbaceae
33.	<i>Pedilanthus tithymaloides</i>	Redbird Cactus	Euphorbaceae
34.	<i>Abrus precatorius</i>	Chunahati	Malvaceae
35.	<i>Lantana camara</i>	Common lantana	Vervanaceae
36.	<i>Duranta plumieri</i>	Pigeon Berry	Vervanaceae
37.	<i>Vitex negundo</i>	Nisenda	Vervanaceae
38.	<i>Clerodendrum infortunatum</i>	Ghetu	Vervanaceae
39.	<i>Clerodendrum inerme</i>	Banajai	Verbanaceae

TABLE - 3.11.6
CHECKLIST OF HERBS & CLIMBERS IN THE STUDY AREA

Sl. No.	Scientific Name	Family
1.	<i>Andrograpis paniculata</i>	Acanthaceae
2.	<i>Justicia simplex</i>	Acanthaceae
3.	<i>Ruellia tuberosa</i>	Acanthaceae
4.	<i>Rungia parviflora</i>	Acanthaceae
5.	<i>Thunbergia grandiflora</i>	Acanthaceae
6.	<i>Daemia extensa</i>	Asclepiadaceae
7.	<i>Vinca rosea</i>	Apocynaceae
8.	<i>Aganosma caryophyllata</i>	Apocynaceae
9.	<i>Amaranthus spinosa</i>	Amaranthaceae
10.	<i>Celosia cristata</i>	Amaranthaceae
11.	<i>Achyranthes aspera</i>	Amaranthaceae

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12.	<i>Alternanthera sessilis</i>	Amaranthaceae
13.	<i>Mikania scandens</i>	Compositae
14.	<i>Eclipta alba</i>	Compositae
15.	<i>Blumea lacera</i>	Compositae
16.	<i>Tridax procumbens</i>	Compositae
17.	<i>Vernonia cinerea</i>	Compositae
18.	<i>Ageratum conyzoides</i>	Compositae
19.	<i>Grangea maderaspatana</i>	Compositae
20.	<i>Gnaphalium indicum</i>	Compositae
21.	<i>Cephalandra indica</i>	Cucurbitaceae
22.	<i>Gynandropsis gynandra</i>	Capparidaceae
23.	<i>Cassia sophera</i>	Caesalpinae
24.	<i>Cassia tora</i>	Caesalpinae
25.	<i>Acalypha indica</i>	Euphorbiaceae
26.	<i>Croton bonplandianum</i>	Euphorbiaceae
27.	<i>Chrozophora plicata</i>	Euphorbiaceae
28.	<i>Desmodium gyrans</i>	Fabaceae
29.	<i>Ocimum sanctum</i>	Labiatae
30.	<i>Leucas aspera</i>	Labiatae
31.	<i>Anisomeles ovata</i>	Labiatae
32.	<i>Oldenlandia corymbosa</i>	Rubiaceae
33.	<i>Dentella repens</i>	Rubiaceae
34.	<i>Spermacoce hispida</i>	Rubiaceae
35.	<i>Solanum nigrum</i>	Solanaceae
36.	<i>Solanum trilobatum</i>	Solanaceae
37.	<i>Nicotiana plumbajinifolia</i>	Solanaceae
38.	<i>Lippia nodiflora</i>	Verbanaceae
39.	<i>Evolvulus nummularius</i>	Convolvulaceae
40.	<i>Ipomea quamoclit</i>	Convolvulaceae
41.	<i>Canscora diffusa</i>	Gentianaceae
42.	<i>Hydrocotyle asiatica</i>	Umbeliferae
43.	<i>Passiflora lunata</i>	Passifloraceae
44.	<i>Sida cordifolia</i>	Malvaceae
45.	<i>Sida rhombifolia</i>	Malvaceae
46.	<i>Triumfetta rhomboidea</i>	Tiliaceae
47.	<i>Cardiospermum halicacabum</i>	Sapindaceae
48.	<i>Cleome viscosa</i>	Capparidaceae
49.	<i>Boerhaavia repens</i>	Nyctaginaceae
50.	<i>Xanthium strumarium</i>	Compositae
51.	<i>Chenopodium album</i>	Chenopodiaceae
52.	<i>Polygonum barbatum</i>	Polygonaceae
53.	<i>Rumex maritimus</i>	Polygonaceae
54.	<i>Hygrophila spinosa</i>	Acanthaceae

55.	<i>Pouzolizia indica</i>	Urticaceae
56.	<i>Cyperus rotundus</i>	Cyperaceae
57.	<i>Pennisetum typhoides</i>	Poaceae
58.	<i>Saccharum spontaneum</i>	Poaceae
59.	<i>Imperata arundinacea</i>	Poaceae
60.	<i>Cynodon dactylon</i>	Poaceae
61.	<i>Eleusine aegyptiacum</i>	Poaceae
62.	<i>Setaria glauca</i>	Poaceae
63.	<i>Argemone maxicana</i>	Papavaraceae
64.	<i>Potrasia coarctata</i>	Poaceae
65.	<i>Flurya interepta</i>	Urticaceae
66.	<i>Vitis quadrifida</i>	Vitaceae
67.	<i>Physalis peruviana</i>	Solanaceae
68.	<i>Oxalis coniculata</i>	Oxalidaceae
69.	<i>Parthenium hysterophorus</i>	Compositae
70.	<i>Derris pinnata</i>	Papilionaceae
71.	<i>Nicotiana plumbajinifolia</i>	Solanaceae
72.	<i>Justicea grandarusa</i>	Acanthaceae

TABLE - 3.11.7
CHECKLIST OF FERNS IN THE STUDY AREA

Sl. No.	Scientific Name	Family
1.	<i>Pteris longifolia</i>	Polypodiaceae
2.	<i>Diplazium sp.</i>	Polypodiaceae
3.	<i>Nephrolepis sp.</i>	Polypodiaceae
4.	<i>Drinaria sp.</i>	Polypodiaceae

Among the most common flora, there were some plants, which have multipurpose use value. The details given in **Table-3.11.8**

TABLE-3.11.8
INVENTORY OF MAJOR USEFUL PLANTS IN THE STUDY AREA

Sl. No.	Species	Plant parts used	Purpose for which used
1.	<i>Eclipta alba</i>	Whole plant	Antiseptic
2.	<i>Sida cordifolia</i>	Root	Antiseptics
3.	<i>Alstonia scholaris</i>	Bark	Gastric ailment
4.	<i>Terminalia arjuna</i>	Bark	Gastric ailments
5.	<i>Aegle marmelos</i>	Fruits, root, leaves	Gastric ailments
6.	<i>Holarrhena antidysentrica</i>	Bark	Gastric ailments
7.	<i>Butea monosperma</i>	Root, Bark	Gastric ailment piles

8.	<i>Clerodendron inerme</i>	Root, leaves	Rheumatism
9.	<i>Vitex negundo</i>	Seed, root	Rheumatism
10.	<i>Tamarindus indica</i>	Leaf, fruit	Edible
11.	<i>Hygrophila spinosa</i>	Leaves, stem	Gastric complaint
12.	<i>Hyptis suaveolens</i>	Leaves	Skin infection
13.	<i>Nyctanthes arbor-tristis</i>	Leaves	Fever, Rheumatism
14.	<i>Daemia extensa</i>	Whole plant	Cantonal affections
15.	<i>Datura metel</i>	Fruit	Cardiac ailment
16.	<i>Acacia nilotica</i>	Leaves, buds	Toothache
17.	<i>Albizia procera</i>	Root, bark	Eye problems

3.11.7.2 Terrestrial Fauna

Both day and night survey was conducted within the study area for the assessment of the prevalence of the respective species.

Domestic animals like crow, buffalo, goat and dog were commonly observed in almost all the sampling locations of the study area. The Damodar River and other water resources within the study area attract the migrating and local birds to from their habitat. The population of crow was observed to be very high in the study area due to large amount of open field and village area. Identically the faunal resources of the area are fairly rich. The details of amphibian, reptilian, avian and mammalian fauna are accounted in the **Table-3.11.9, 3.11.10, 3.11.11 & 3.11.12**. It may be observed from the tables that the species observed are of general nature.

TABLE-3.11.9
CHECKLIST OF AMPHIBIANS

Sl. No.	Species	Common Name	Status	Wildlife Schedule
1.	<i>Bufo melanostriatus</i> (Schneider)	Common Indian Toad	Common	IV
2.	<i>Bufo stomaticus</i> (Lutken)	Marbled toad	Common	IV
3.	<i>Rana cynophlyctis</i> (Schneider)	Skipping frog	Common	VI
4.	<i>Rana limnocharis</i> (Boie)	Paddy field frog	Common	VI
5.	<i>Rana tigrina</i> (Daudin)	Indian bull frog	Common	VI

**TABLE-3.11.10
CHECKLIST OF REPTILES**

Sl. No.	Species	Common Name	Occurrence
1.	<i>Hemidactylus brooki</i> (Gray)	Brook's gecko	Common
2.	<i>Hemidactylus flaviviridis</i> (Ruppell)	Northern house gecko	Common
3.	<i>Calotes versicolor</i> (Daudin)	Common Garden lizard	Common
4.	<i>Mabuya craniata</i> (Schneider)	Common or Brahminy skink	Common
5.	<i>Mabuya macularia</i> (Blyth)	Little Skink	Common
6.	<i>Typhlops acutus</i> (Dummeril & Bibron)	Beaked worm or Blind Snake	Common
7.	<i>Lycodon aulicus</i> (Linn.)	Common wolf snake	Common
8.	<i>Ptyas mucosus</i> (Linn.)	Dhaman or Common Rat Snake	Common
9.	<i>Xenochrophis piscator</i> (Schneider)	Checkered Keel back	Common
10.	<i>Bungarus caeruleus</i> (Schneider)	Common Indian Krait	Common

**TABLE - 3.11.11
CHECKLIST OF BIRDS**

Sl. No.	Scientific Name	Common Name	Migratory Nature
1.	<i>Ardea cinerea</i> (Linn.)	Grey Heron	R
2.	<i>Ardea purpurea</i> (Meyea)	Purple Heron	R
3.	<i>Ardeola grayii</i> (Sykes)	Pond Heron	R
4.	<i>Bubulcus ibis coromandra</i> (Boedaert)	Cattle egret	R
5.	<i>Ardea alba</i> (Linn.)	Large Egret	R
6.	<i>Egretta garzetta</i> (Linn.)	Little egret	R
7.	<i>Dendrocygna javanica</i> (Horsefield)	Lesser Whistling Teal	R/M
8.	<i>Anas acuta</i> (Linn.)	Pintail	M
9.	<i>Nettapus coromandelianus</i>	Cotton Teal	R
10.	<i>Sarkidiornis melanotos</i>	Comb Duck	M
11.	<i>Tringa ochropus</i>	Green Sandpiper	M
12.	<i>Tringa hypoleucos</i> Linn.	Common Sandpiper	R/M
13.	<i>Streptopelia decaocto</i> (Frivoldszky)	Indian Ringed Dove	R
14.	<i>Streptopelia tranquebarica</i> (Temminck)	Red Turtle Dove	R
15.	<i>Streptopelia chinensis</i> (Gmelin)	Spotted Dove	R

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16.	<i>Eudynamys scolopacea (Linn.)</i>	Koel	R
17.	<i>Centropus sinensis (Stephens)</i>	Coucal	R
18.	<i>Apus affinis (J. E. Gray)</i>	House Swift	R
19.	<i>Cypsiurus parvus (J. E. Gray)</i>	Palm Swift	R
20.	<i>Alecdo athis (Linn.)</i>	Common Kingfisher	R
21.	<i>Merops orientalis (Latham)</i>	Green Bee-eater	R
22.	<i>Coracias benghalensis (Linn.)</i>	Indian Roller	Lm
23.	<i>Hirundo rustica Linn.</i>	Swallow	M
24.	<i>Oriolus xanthornus (Linn.)</i>	Black-headed oriole	R
25.	<i>Dicrurus adsimilis macrocercus (Vieillot)</i>	Black Drongo	R
26.	<i>Stunus malabaricus</i>	Greyheaded Myna	R
27.	<i>Sturnus contra (Linn.)</i>	Pied Myna	R
28.	<i>Acridotheres fuscus (Wagler)</i>	Jungle Myna	R
29.	<i>Acridotheres tristis (Linn.)</i>	Common Myna	R
30.	<i>Corvus splendens (Vieillot)</i>	House Crow	R
31.	<i>Turdoides striatus</i>	Jungle Babbler	R
32.	<i>Cisticola juncidis cursitaus (Franklin)</i>	Streaked Fantail Warbler	R
33.	<i>Orthotomus sutories patia (Hodgson)</i>	Tailor bird	R
34.	<i>Acrocephalus dumetorum (Blyth)</i>	Blyth's Reed Warbler	M
35.	<i>Anthus nonaesuleudiae rufulus (Vieillot)</i>	Paddy Field Pipit	M
36.	<i>Motacilla alba dukhunensis (Sykes)</i>	Pied Wagtail	M
37.	<i>Nectarinia zeylonica sola (Vieillot)</i>	Purple-rumped Sunbird	R
38.	<i>Nectirinia asiatica</i>	Purple Sunbird	R
39.	<i>Passer domesticus (Jardine & Selby)</i>	House Sparrow	R
40.	<i>Lonchura punctulata (Linn.)</i>	Spotted Munia	R
41.	<i>Amaurornis phoenicurus (Boddaert)</i>	Whitebreasted waterhen	R
42.	<i>Gallinula chloropus</i>	Moorhen	R/M
43.	<i>Porphyrio porphyrio poliocephala (Latham)</i>	Purple Moorhen	Lm
44.	<i>Fulica atra (Linn.)</i>	Coot	M
45.	<i>Phalacrocorax carbo</i>	Cormorant	Lm
46.	<i>Phalacrocorax niger</i>	Little Cormorant	R
47.	<i>Anhinga rufa</i>	Darter	R
48.	<i>Psittacula eupatria (Linn.)</i>	Alexandrine Parakeet	R
49.	<i>Psittacula krameri (Neumann)</i>	Roseringed Parakeet	R
50.	<i>Psittacula cyanocephala</i>	Blossom Headed Parakeet	R

(Key : R=Resident; Lm = Local Migrant; M= Migratory)

TABLE-3.11.12
CHECKLIST OF MAMMALS

Sl. No.	Species	Common Name	Occurrence
1.	<i>Paradoxurus hermaphroditus</i>	Palm Civet	Common
2.	<i>Funumbulus pennanti</i>	Five Striped Squirrel	Common
3.	<i>Rattus rattus rufescens</i> (Gray)	House Rat	Common
4.	<i>Rattus rattus arboreus</i> (Horsefield)	Tree Rat	Common
5.	<i>Viverricula india indica</i> (Desmarest)	Small Indian Civet	Rare
6.	<i>Mus musculus castaneus</i> (Waterhouse)	House Mouse	Common
7.	<i>Mus musculus urbanus</i> (Hodgson)	House Mouse	Common
8.	<i>Cynopterus sphinx sphinx</i> (Vahl)	Short-nosed Fruit-bat	Common
9.	<i>Rousettus leschenaulti leschenaulti</i> (Desmarest)	Fulvous Fruit-Bat	Common
10.	<i>Vulpes bengalensis</i> (Shaw)	Bengal Fox	Rare
11.	<i>Mus booduga booduga</i> Gray		Common
12.	<i>Bandicota indica nemorivaga</i> (Hodgson)	Indian Mole Rat	Common

3.11.8 Aquatic Ecology:

As already stated earlier that the study area having Panchet Reservoir, Damodar River, Barakar River, Khudia River, several canals, beels, ponds, roadside burrows and several other categories of water bodies, so the richness and diversity of aquatic flora and fauna is also very high. The major forms of aquatic biota as recorded during the survey are as follows:

- Macrophytic flora
- Planktons
- Fish
- Water birds

3.11.8.1 Macrophytic vegetation of water bodies:

These are a number of plants found in various aquatic bodies. The details are given in **Table-3.11.13**.

TABLE-3.11.13
CHECKLIST OF MACROPHYTES & OTHER MARSHY PLANTS

Sl. No.	Scientific Name	Family
1.	<i>Ottelia alismoides</i>	Alismataceae
2.	<i>Alternanthera phylloxeroides</i>	Amaranthaceae
3.	<i>Colocasia esculenta</i>	Araceae
4.	<i>Hygrophilla spinosa</i>	Acanthaceae
7.	<i>Ludwigia apscendens</i>	Onagraceae
5.	<i>Nymphaea naucheli</i>	Nympheaceae
6.	<i>Spirodela polyrhiza</i>	Lemnaceae
7.	<i>Lemna purpusila</i>	Lemnaceae
8.	<i>Eichornia crassipes</i>	Hydrocharitaceae
9.	<i>Vallisneria spiralis</i>	Hydrocharitaceae
10.	<i>Pistia stratiotes</i>	Hydrocharitaceae
11.	<i>Monochorea hastae</i>	Hydrocharitaceae
12.	<i>Hydrolea zeylanica</i>	Hydrophyllaceae
13.	<i>Urticularia sp.</i>	Lentibulariaceae
14.	<i>Typha domingensis</i>	Typhaceae
15.	<i>Enhydra fluctuan</i>	Compositae
16.	<i>Ipomea aquatica</i>	Convolvulaceae
17.	<i>Ceratophyllum demursum</i>	Ceratophyllaceae
18.	<i>Scirpus articulatus</i>	Cyperaceae
19.	<i>Salvinia natans</i>	Salviniaceae
20.	<i>Azolla pinnata</i>	Salviniaceae
21.	<i>Phragmites karka</i>	Graminae
22.	<i>Sagittaria sagififolia</i>	Alismataceae
23.	<i>Marsilea minuta</i>	Marseliaceae
24.	<i>Nymphoides speltatum</i>	Gentianaceae
25.	<i>Eclipta prostrata</i>	Compositae
26.	<i>Aeschynomene aspera</i>	Fabaceae
27.	<i>Limnophila indica</i>	Scrophulariaceae
28.	<i>Trapa bispinosa</i>	Trapaceae
29.	<i>Jusea repens</i>	Ongraceae

3.11.8.2 Planktons

For planktonic analysis five surface water bodies were sampled in the field with the help of planktons net (40 mesh). Planktons were collected quantitatively for plankton load studies. The details of plankton load and diversity is given in **Table-3.11.14**.

**TABLE-3.11.14
LIST OF PLANKTONS**

LIST OF PHYTOPLANKTONS OBSERVED	LIST OF ZOOPLANKTONS OBSERVED
• <i>Microcystis sp.</i>	• <i>Brachinus sp.</i>
• <i>Navicula sp.</i>	• <i>Keratella sp.</i>
• <i>Pleurosigma sp.</i>	• <i>Mysis sp.</i>
• <i>Spirogyra sp.</i>	• <i>Daphnia sp</i>
• <i>Oscillatoria sp.</i>	• <i>Bosmina sp</i>
• <i>Scenedesmus sp.</i>	• <i>Nauplius sp</i>
• <i>Cymbella sp.</i>	• <i>Cypris sp</i>
• <i>Closterium sp.</i>	

3.11.8.3 Fish:

Most of the water bodies having fresh water fishes (common carps and others). A detailed check list is given in the **Table-3.11.15**.

**Table-3.11.15
CHECKLIST OF FISHES**

Sl. No.	Scientific Name	Common Name
1.	<i>Lates calcarifera</i> (Bloch)	Bhetki
2.	<i>Glossogobius giuris</i> (Hamilton)	Beley
3.	<i>Salmostoma sardinella</i> (Hamilton)	Chela
4.	<i>Osteobrama cotio cotio</i> (Hamilton)	Chanda
5.	<i>Catla catla</i> (Hamilton)	Catla
6.	<i>Channa orientalis</i> (Schneider)	Chang
7.	<i>Hypophthalmichthys molytrix</i> (Valenciennes)	Silver carp
8.	<i>Cirrhinus mrigala</i> (Hamilton)	Mrigal
9.	<i>Cyprinus carpio</i> (Linnaeus)	American rui
10.	<i>Labeo rohita</i> (Hamilton)	Rohu
11.	<i>Labeo bata</i> (Hamilton)	Bata
12.	<i>Labeo kalbasu</i> (Hamilton)	Kalbous
13.	<i>Puntius saphori</i> (Hamilton)	Punthi
14.	<i>Clarius batracus</i> (Linnaeus)	Magur
15.	<i>Heteropneustes fossilis</i> (Bloch)	Singi
16.	<i>Channa striatus</i> (Bloch)	Shol
17.	<i>Channa punctatus</i> (Bloch)	Lata
18.	<i>Oriochromis mossambica</i> (Peters)	Tilapia
19.	<i>Anabas testudineus</i> (Bloch)	Koi
20.	<i>Mastacembelus armatus</i> Lacepede	Pakal
21.	<i>Mastacembelus pancalus</i> Hamilton	Pakal

3.11.8.4 Water birds:

There are a good number of water birds noticed in the study area during the field survey period. The details are given in the **Table-3.11.16**.

TABLE – 3.11.16
CHECKLIST OF WATER BIRDS

Sl. No.	Common Name	Scientific Name
1.	Little Grebe	<i>Podiceps ruficollis</i>
2.	Cormorant	<i>Phalacrocorax carbo</i>
3.	Little Cormorant	<i>Phalacrocorax niger</i>
4.	Darter	<i>Anhinga rufa</i>
5.	Grey Heron	<i>Ardea cinerea</i>
6.	Purple Heron	<i>Ardea purpurea</i>
7.	Pond Heron	<i>Ardeola grayii</i>
8.	Cattle Egret	<i>Bubulcus ibis</i>
9.	Large Egret	<i>Ardea alba</i>
10.	Smaller Egret	<i>Egretta intermedia</i>
11.	Little Egret	<i>Egretta garzetta</i>
12.	Yellow Bittern	<i>Ixobrychus sinensis</i>
13.	Lesser Whistling Teal	<i>Dendrocygna javanica</i>
14.	Pintail	<i>Anas acuta</i>
15.	Garganey	<i>Anas querquedula</i>
16.	Cotton teal	<i>Netapus coromandelianus</i>
17.	Comb Duck	<i>Sarkidiornis melanotos</i>
18.	Whitebreasted Waterhen	<i>Amauornis phoenicurus</i>
19.	Moorhen	<i>Gallinula chloropus</i>
20.	Purple Moorhen	<i>Porphyrio porphyrio</i>
21.	Coot	<i>Fulica atra</i>
22.	Pheasant-tailed jacana	<i>Hydrophasianus chirurgus</i>
23.	Bronzewinged Jacana	<i>Metopidius indicus</i>
24.	Green Sandpiper	<i>Tringa ochropus</i>
25.	Common Sandpiper	<i>Tringa hypoleucos</i>
26.	Pintail Snipe	<i>Gallinago stenura</i>

CONCLUSION:

The present observation revealed that the terrestrial aquatic vegetation of 10 km radius of the proposed project is very rich and diverse.

Among terrestrial flora qualitatively altogether 75 species of tree, 39 species of Shrubs, 72 species of herbs and climbers were observed. High value (4.51) of shannon –weiner index indicated that biodiversity status of the area is very high.

Terrestrial fauna was also rich. Altogether 12 species of mammals, 50 species of birds, 10 species of reptiles and 5 species of amphibians were recorded.

The aquatic ecology encompasses a major river i.e., Damodar river, several big and small ponds, jheels, beels, tanks and ditches. Altogether 29 species of macrophytes & other marshyplants, 15 species of phytoplankton & zooplanktons each are observed. So, enough richness has been observed in

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aquatic flora and fauna. Thus, it may be concluded that the water reservoirs of the study area are rich in primary producers (i.e. phytoplanktons) and any reduction in their numbers may affect the level of dissolved oxygen in water.

By contrast the zooplanktons constitute a link between primary producers and ecologically important consumers i.e., fish community (21 species). Hence, any destruction of zooplanktons may lead to break in transfer of energy from producers to consumers. It causes imbalance in aquatic ecosystems.

No species were found to be endangered. There were no migratory routes of fauna, presence of breeding grounds and sensitive habitats and absence of protected areas.

The biodiversity index (4.51) is quite high which signifies high species richness and diverse vegetation.

Since the proposed project shall adopt zero discharge concept, no adverse impact on aquatic ecology will be seen. The plant drainage system will be suitably designed so that the storm water does not carry any pollutants.

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3.12 DEMOGRAPHY & SOCIO-ECONOMIC STATUS

3.12.1 GENERAL DESCRIPTION

The growth of industrial sectors and infrastructure developments in and around the agriculture dominant areas, village and towns is bound to create its impact on the socio-economic aspects of the local population of the area experiencing development. The impacts may be positive or negative depending upon the development activity. To assess the anticipated impacts of the project and industrial growth on the socio-economic aspects of people, it is necessary to study the existing socio-economic status of the local population, which will be helpful for making efforts to further improve the quality of life in the area under study.

The sociological aspects of this study include human settlements, demography, and social strata such as Scheduled Castes and Scheduled Tribes and literacy levels besides infrastructure facilities available in the study area. The economic aspects include occupational structure of workers.

The Baseline Demographic and Socio economic characteristics with regards to demography, literacy and occupational status have been described based on the Primary Census Abstract, 2011. The project site for proposed expansion project is located at village - Benipur, P.O.: Saltor, Dist. Purulia in the state of West Bengal. The 10 km radius study area around the project site comprises of 166 villages and part of Kulti and Chirkunda municipal areas. A comparative assessment has been made for the respective demographic aspects, based on the year 2011 Census data, which has been discussed in the following sections.

The major portion of the study area is basically rural in nature and some portion is urban with moderately populated with the total population of 4,51,820 (as per 2011 Census). Scheduled Caste (SC) and Scheduled Tribe (ST) population in the study area is about 24.85% and 11.21% w.r.t. the total population respectively. The sex ratio in the study area is about 930 females per 1000 males. The overall literacy rate is about 62.09% of the total population. The principal language is Bengali and the principal staple food is rice. The primary sources of drinking water are tube wells, Hand pump water in rural areas and tube wells, Hand pump and Supply water in urban areas.

3.12.2 DEMOGRAPHIC ASPECTS

3.12.2.1 Average Household Size:

The Study area has an average family size of around 5.3 persons per household. This is considered to be a little high family size in West Bengal.

3.12.2.2 Overall population density and family size:

As per 2011 census, the total population in the study area is 4,51,820. According to this population in the study area Population Density is approximately 1438 persons per square kilometer. Total population, population density & family size have been shown below in **Table-3.12.1**.

TABLE-3.12.1
OVERALL POPULATION DENSITY AND FAMILY SIZE

Sl. No.	Particulars	Number
1	No. of Household	85486
2	Population Density	1438 Nos./sq.km
3	Family Size	5.3
4	Male Population	234080
5	Female Population	217740
6	Total Population	451820

Source: Census of India, 2011

3.12.2.3 Sex Ratio:

According to 2011 census, the sex ratio (female per 1000 male) in the rural segment of the study area is 944 and in the urban segment of the study area is 922. As a whole sex ratio of the study area is also 930. Segment-wise sex Ratio of the study area is tabulated in **Table-3.12.2**.

TABLE-3.12.2
SEX RATIO OF THE STUDY AREA

Sl. No.	Segment of the area	Females per 1000 males
1	Rural	944
2	Urban	922
3	Whole	930

Source: Census of India, 2011

3.12.2.4 Population structure:

As per 2011 census total rural population within the study area is 1,62,492 having 51.43% of male and 48.57% of female population. In comparison with rural population, total urban population within the study area is 2,89,328 with male and female population is 52.02% & 47.98% respectively. As a whole total population within the study area is 4,51,820 with total male and total female population is 51.81% & 48.19% respectively. The above table reveals that only about 35.96% of the total population within the study area belongs to the rural area. Population structure of the study area is tabulated in **Table-3.12.3**.

TABLE-3.12.3
POPULATION STRUCTURE OF THE STUDY AREA

Sl. No.	Segment of the area	Male	Female	Total	No. of Household
1	Rural	83576	78916	162492	5.4
2	Urban	150504	138824	289328	5.3
3	Total	234080	217740	451820	5.3

Source: Census of India, 2011

3.12.2.5 Social Structure:

As per 2011 census, the Scheduled caste (SC) population in the rural sector of the study area is 25.01% of the total rural population, which is nearly equal to the urban sector of the study area, which is 24.76% of the total urban population. As a whole, SC population is 24.85% w.r.t. the total population in the study area.

As per 2011 census, Scheduled Tribe (ST) population in the rural sector of the study area is 21.23% of the total rural population which is quite higher than the urban sector of the study area, which is 5.58% of the total urban population. As a whole, ST population is 11.21% w.r.t. the total population in the study area.

Scheduled caste and scheduled tribe population in rural and urban segment of the study area is shown in **Table-3.12.4**.

TABLE-3.12.4
SOCIAL STRUCTURE OF THE STUDY AREA

Segment of the Area	NUMBER OF POPULATION								
	Total Population			Scheduled Caste			Scheduled Tribe		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Rural	83576	78916	162492	20761	19880	40641	17428	17063	34491
Urban	150504	138824	289328	36665	34975	71640	8078	8074	16152
Total	234080	217740	451820	57426	54855	112281	25506	25137	50643

3.12.2.6 Literacy Level:

Total literacy rate in rural sector of the study area is 55.69% of the total rural population whereas male literacy rate is 66.34% of the total rural male population and female literacy rate is 44.42% of total rural female population while total literacy rate in urban sector of the study area is 65.68% of the total urban population where male literacy rate is 72.62% of the total urban male population and female literacy rate is 58.16% of the total urban female population. The overall literacy rate in the study area is about 62.09% w.r.t. the total population where male literacy rate is 70.38% (w.r.t. the total male population) and female literacy rate is 53.18% (w.r.t. the total female population). Population classification for literates in the study area is presented **Table-3.12.5**.

TABLE-3.11.5
LITERACY LEVEL IN THE STUDY AREA

Area	No. of Literates		
	Male	Female	Total
Rural	55444	35051	90495
Urban	109292	80743	190035
Total	164736	115794	280530

Source: Census of India, 2011

3.12.3 OCCUPATIONAL STRUCTURE

The occupational structure of population in the study area is studied with reference to main workers and marginal workers. As per Indian Census, all persons engaged in 'work' defined as participation in any economically productive activity with or without compensation, wages or profit are workers.

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The Reference period for determining a person as worker and non-worker is one year preceding the date of enumeration. The Census classifies Total Workers into two groups namely, (i) Main workers (ii) Marginal workers. Main Workers who had worked for the major part of the reference period i.e. 6 months or more. Marginal Workers who had not worked for the major part of the reference period i.e. less than 6 months.

The main workers include 10 categories of workers defined by the Census Department, which consist of cultivators, agricultural laborers, those engaged in live-stock, forestry, fishing, mining and quarrying; manufacturing, processing and repairing in household industry and other than household industry, construction, transport and communication, trade and commerce and other services.

3.12.3.1 Workers and Non-workers:

i) Total Workers:

Total Worker in rural areas is 34.58% of the total rural population of 162492 and Total Worker in urban areas is 30.58% of the total urban population of 289328, while overall total worker is 32.01% of the overall total population of 451820 in the study area according to 2011 Census. The total workers are divided into main and marginal workers.

ii) Main Workers:

Main Worker in rural areas is 58.11% of the total rural worker of 56183 and Main worker in urban areas is 78.28% of the total urban worker of 88465, while overall total Main worker is 70.45% of the overall total worker of 144648 in the study area according to 2011 Census.

iii) Marginal Workers:

Marginal Worker in rural areas is 41.89% of the total rural worker of 56183 and Marginal worker in urban areas is 21.72% of the total urban worker of 88465, while overall total Marginal worker is 29.55% of the overall total workers of 144648 in the study area according to 2011 Census.

iv) Non-workers:

Non-Worker in rural areas is 65.42% of the total rural population of 162492 and Non-Worker in urban areas is 69.42% of the total urban population of 289328, while overall Non-worker is 67.99% of the overall total population of 451820 in the study area according to 2011 Census.

The occupational status of workers and non-workers has been shown in **Table – 3.12.6**.

TABLE – 3.12.6
OCCUPATIONAL STATUS OF THE STUDY AREA

Area	No. of workers						No. of non-workers			Total Population (3)+(6)+(9)
	Main Workers			Marginal Workers						
	Male (1)	Female (2)	Total (3)	Male (4)	Female (5)	Total (6)	Male (7)	Female (8)	Total (9)	
Rural	27880	4769	32649	15754	7780	23534	39942	66367	106309	162492
Urban	61578	7671	69249	14114	5102	19216	74812	126051	200863	289328
Total	89458	12440	101898	29868	12882	42750	114754	192418	307172	451820

Source: Census of India, 2011

3.12.3.2 Classified Occupational Status:

Cultivators and agricultural workers in rural areas are 2.97% and 2.23% respectively w.r.t. the total rural population of 162492 and in urban areas these are 0.52% and 0.40% respectively w.r.t. the total urban population of 289328. Overall cultivators and agricultural workers are 1.40% and 1.06% respectively w.r.t. the total population 451820 in the study area. The classified occupational status in the study area has been tabulated in **Table-3.12.7**.

TABLE-3.12.7
CLASSIFIED OCCUPATIONAL STATUS

Area	Cultivators			Agricultural Workers			Others		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Rural	4177	646	4823	2765	864	3629	20165	2909	23074
Urban	1327	182	1509	979	168	1147	58226	7066	65292
Total	5504	828	6332	3744	1032	4776	78391	9975	88366

Graphical presentations of demographical and occupational status have been given below in **FIGURE-3.12.1**.

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3.12.4 INFRASTRUCTURE FACILITIES:

Medical Facilities

Medical facility in some form or the other is available to the population residing with the rural segment of the study area. However, medical facilities i.e. Hospital with basic facilities only is available within the urban segment of the study area.

Drinking Water Facilities

Ground water is being used in the different village located in the rural sector as well as urban sector of concerned C.D Blocks. In the urban areas tube well, bore well, and supplied water are the source of drinking water and the in the rural areas mainly the tube well is being used for drinking water purposes.

Electricity

Most of the villages have electricity in the Concerned C.D Blocks. Available for domestic purposes.

Communication Transport & Access Facilities

Most of the villages in the concerned C.D Block have Post Office available within study area. All most of the villages have Bus connectivity. Approach paved road is available in the all village area. In the urban area surface rail, Buses and rickshaw etc are available for communication.

3.12.5 SUMMARY AND CONCLUSION OF SOCIO ECONOMIC SETTING

The Baseline Demographic and Socio economic characteristics with regards to demography, literacy and occupational status have been described based on the Primary Census Abstract, 2011. The study area is basically rural in nature and moderately populated with the population density of approximately 1438 persons per square kilometer. The Study area has an average family size of around 5.3 persons per household which is considered to be a little higher family size. Only about 36% of the total population within the study area belongs to the rural area. As a whole, SC & ST population is 25% & 11% respectively w.r.t. the total population in the study area. The overall literacy rate in the study area is about 62% w.r.t. the total population. Total worker is 32% of the total population.

Moderate medical facilities is available in the study area. Tap water, ground water and surface water is being used in the different villages, located in the rural sector of concerned C.D Blocks. In the urban area tube well and tap water are the sources of drinking water. Most of the villages have electricity.

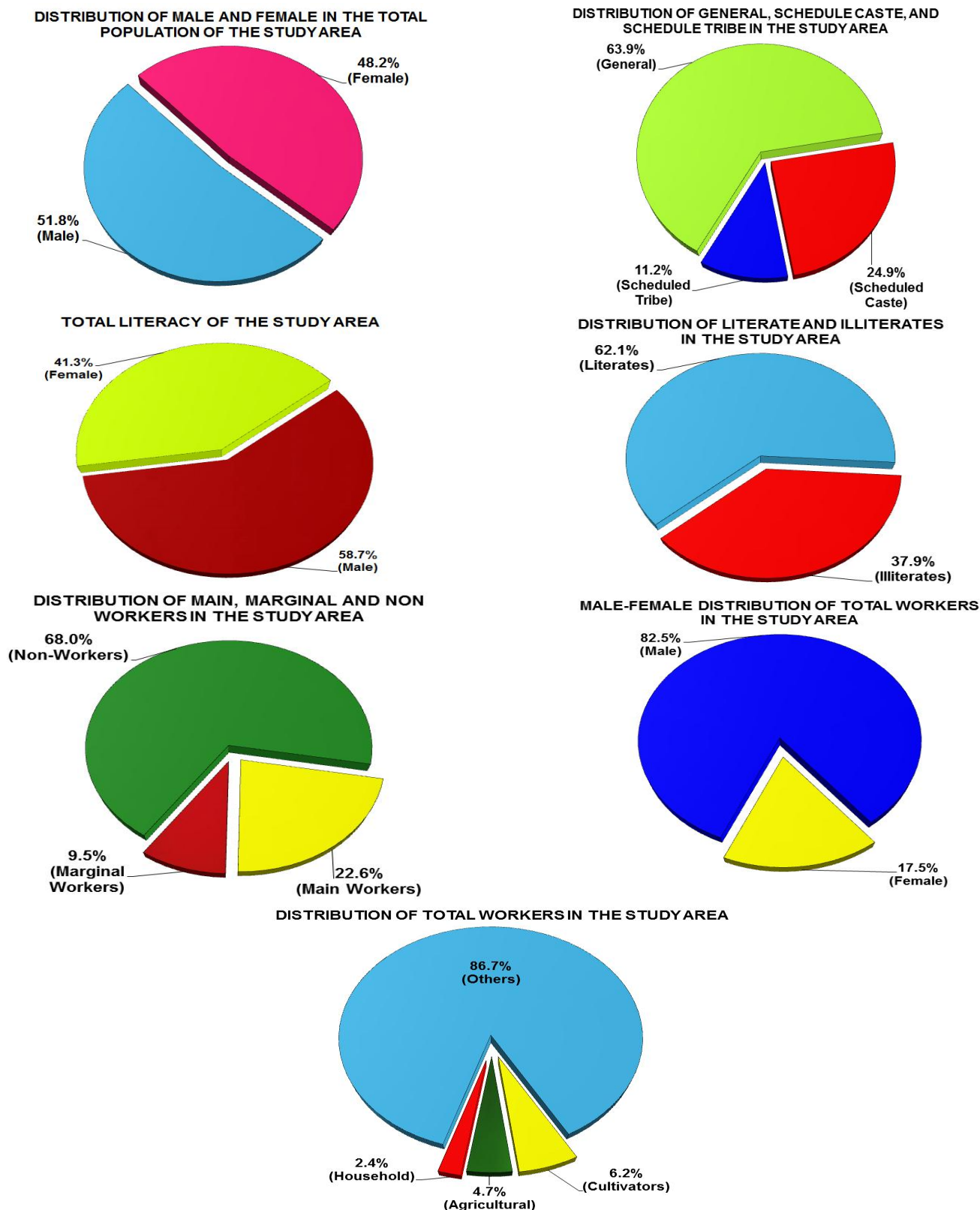


FIGURE-3.12.1
GRAPHICAL PRESENTATION OF DEMOGRAPHIC & SOCIAL
STATUS (BASED ON 2011 CENSUS DATA)

CHAPTER-4.0

ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 PROJECT ACTIVITIES

4.1.1 Phases of Impacts

The proposed project will have impacts on the environment in two phases. During the construction phase, which is temporary and short-term, the other during the operation stage, which will have long term effects. The environmental impacts in this study have been discussed separately for the construction phase and the operation stage.

Spatially, the impacts have been assessed over the study area of 10 km radius of the project site. Overall impacts in the regional context are negligible.

4.2 IMPACTS DURING CONSTRUCTION PHASE

4.2.1 Activities during Construction Phase

During the construction phase, the following activities are considered to be important towards development of impacts:

- a) Site preparation
- b) Excavation and back filling
- c) Hauling of earth materials
- d) Piling, cutting and drilling
- e) Erection of concrete and steel structures
- f) Road construction
- g) Painting and finishing
- h) Clean up operations
- i) Landscaping and Afforestation

Construction phase activities will have moderate impacts on land use, demography and socio-economics, on-site soils and on-site noise. It could also develop minor impacts on water use, air and water quality and ecology.

The activities can be divided into two categories, viz. sub-structural and super-structural work. Certain foundation would require pile driving and the machineries would pose noise and gaseous pollution.

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Besides, construction work will involve cutting of trenches, excavation, concreting etc. which may generate dust, gaseous and noise pollution.

Mechanical erection work involves use of different mechanical equipment for storage, transportation, erection and on-site fabrication work. These activities may result in the generation of air and noise pollution, which will be contained by using water sprinkling and noise abatement measures respectively.

4.2.2 Impacts on Air Quality

Particulate matter would be the predominant pollutant affecting the air quality during the construction phase. The activities like excavation, back filling and hauling operations along with transportation will generate dust emissions. However, the impact will be for a short duration. Moreover, this will be confined within the plant site and is expected to be negligible outside the plant boundary. The impact will, however, be marginal and temporary in nature.

Mitigation Measures

- For the suppression of fugitive dust, sprinkling of water from tankers or other suitable means would be undertaken at the construction sites.
- The traffic and use of machineries will generate undesirable gaseous pollutants. The expected emission level would be insignificant.
- It would be ensured that all the vehicles plying during construction are properly tuned and maintained to keep emissions within the permissible limits.
- Proper greenbelt development and plantation inside and outside the plant premises.
- A separate storage area will be demarcated for construction material to confine the dust dispersion.
- Proper PPEs will be provided to workers to avoid accumulation of dust in respiratory tracts and prevent air borne diseases.

4.2.3 Impacts on Hydrology and Water Use

As the construction activities will take place inside the plant premises, it will not alter the local drainage pattern and thus, is not expected to have any impact on the local hydrology.

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4.2.4 Impacts on Water Quality

Water will be used for construction of civil structures, dust suppression and drinking purpose. Stagnant pools of water would promote breeding of mosquitoes and generally create unsanitary conditions. However, adequate arrangements would be made to ensure proper drainage of wastewater from the construction sites, so that such waters do not form stagnant pools nor aggravate soil erosion.

The waste water during construction will contain only suspended impurities. This water would be passed through settling ponds and recycled for use in gardening, dust suppression purposes etc. During monsoons, the water will be discharged to the nearest drain after passing the waste-water through settlements. Drinking water facility will be provided to the construction workers and domestic waste water will be discharged into the portable sewage treatment plant.

Mitigation Measures

- Domestic waste water will be disposed off in portable STP.
- Construction workers will be brought from nearby villages so that domestic water is saved in many ways due to temporary requirements only.
- The drains will be properly aligned in conformity with the site drainage pattern so that the alteration is kept to the minimum and flooding or soil erosion does not occur.
- No discharge of any kind will be done inside or outside plant premises in any water body.
- No discharge of waste water generated during construction activity will be done on soil or land area.

Thus, there will not be any discharge from the site which can have any impact on the water quality of the surrounding areas.

4.2.5 Impacts on Noise

During the construction phase, noise will be generated from various construction activities as listed below:

- Movement of vehicles carrying materials and loading & unloading activities;
- Excavation machines, concrete mixer and other construction machines;
- Operation of DG sets;
- Concreting, hammering, etc; and

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- Mechanical operations, like, drilling, fitting, etc.

All the above mentioned sources will be intermittent and would be experienced occasionally. It may also be noted that, most of the construction activities will be carried out only during the daytime. The expected noise levels from these activities are as per given here under:

Particulars	Noise Levels dB(A)
Earth Movers:	
Front End Loaders	72-84
Heavy Duty Bulldozer	91-95
Tractors	76-96
Scrapers, Graders	80-93
Pavers	86-88
Trucks	82-94
Material Handlers:	
Concrete mixers	75-88
Concrete Pumps	81-88
Tower Crane	70-76
Power Shovel	80-93
Vibratory Pile Driver	90-95
Drum Mixer	75-80
Drum Truck	80-85
Stationary Equipment:	
Pumps	69-71
Generators	71-82
Other Construction Equipment:	
Wheel Loader	87-95
Truck Mounted Crane	76-83
Bar Bender	90-94
Operating a Welder	80-85

The resultant maximum noise level for the above sources as calculated using combined effect equation is 87 dB(A). The sound pressure level generated by noise sources decreases with increasing distance from the source due to wave divergence. An additional decrease in sound pressure level from the source is expected due to atmospheric effect or its interaction with objects in the transmission path.

The noise produced during construction phase will have temporary impact on the existing ambient noise levels at the project site but restricted to small distance. The general noise levels due to construction activities and machinery installation may sometimes go up to 85 dB(A) at the work sites during day time. Workers in general are likely to be exposed to an equivalent noise level of 80-85 dB (A) in 8 hour shift.

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Mitigation Measures to minimise noise pollution

- Selection of low noise generating machinery/equipment;
- Engineering specifications shall be stipulated as a condition to maintain noise level equal to or less than 75 dB(A) at 1 meter from all the relevant sources;
- Provision of rubber padding/noise isolators/silencers to contain the noise generated by machinery/equipment, wherever possible;
- Provision of protective equipment like ear muff/ plug to the workers;
- Preventive maintenance of machinery/equipment as well as vehicles;
- Demarcation of high noise zones at site with enclosures & barriers;
- All employees shall be encouraged to cooperate in following safe work practices;
- Information on noise, the risks of exposure to noise and the appropriate control measures shall be displayed at the workplace;
- Appropriate training and education will be given to the workers;
- Regular monitoring of ambient noise level as per monitoring plan shall be carried out;

4.2.6 Impacts on Soil and Land Use

All major construction activities tend to create certain changes in the soils of the area. The excavated top soil will be stacked with grass turf and will be used for back filling/plantation. Topsoil would be used for greenbelt strengthening within the plant and its periphery, which would help in restricting the impacts due to the construction activities by creating a physical barrier.

During storms, some of the excavated soil and construction materials such as sand etc. would be blown up in the air and dispersed around the project site; some would also tend to be driven into the soil and clog inter granular spaces. However, in order to minimise such impacts, sprinkling of water shall be done.

With the adoption of the above stated mitigation measures, the marginal adverse impact would be reduced to no impact and will be confined within the project area and will not hamper the land use aspects outside. Hence, the impact due to this will be insignificant, reversible and short term in nature.

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Impacts on Land Use

Minor vegetation is present within the site. Hence, there will be minimal impact on land environment during construction. As minor vegetation will be removed from the project site, the same will be compensated by Green Belt development over an area of 8.16 acres (3.30 hectares) i.e., 33% areas of total plant premises.

Although the overall impact on land environment is beneficial, still the following mitigation measures would be adopted for management of solid waste:

- I. Attempt should be made to utilise the solid wastes through practicable ventures. The solid wastes management plan has been discussed separately under 'Impact due to solid wastes', where it has been proposed how solid wastes dumping can be avoided.
- II. The land area needs to be judiciously used through the tool of proper layout planning. The plant's general layout has been designed in such a way that minimizes built-up area and maximizes the land usage for open area and greenery development.
- III. Vacant areas would be made available for greenbelt and landscaping development to promote ecological improvement of the study area.

4.2.7 Impacts on Demography & Socio-economics

It is estimated that 2100 numbers of workers, comprising of skilled, semi-skilled and unskilled labourers, shall be employed by various contractors at site during the construction phase. Significant number of semiskilled and unskilled labourers would be recruited from the nearby areas. This would create some employment opportunities in the area.

Since most of sizeable labour force will be drawn from neighbourhood, no change in demographic profile is anticipated. However, there will be increased economic opportunities for the local people.

Most of the construction work is labour intensive. As most of the job will be done by the contractors, it will be ensured that the

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contractor's workers are provided with proper facilities including sanitation and drinking water supply.

Facilities to be provided at the time of construction phase to the workers/ labours are:

- 1) Provision of drinking water, waste water disposal and solid waste management will be ensured for labour camps.
- 2) Proper Sanitation facility will be provided for construction workers to ensue environmental sanitation. Sewage generated from the area occupied by the construction labourers will be directed into the existing sewage drain of the area. Apart from that portable sanitation toilet will be provided
- 3) Maximum labours/ workers will be drawn from neighborhood. Still proper hutment with fuel for cooking will be provided for migrant workers.

4.3 IMPACTS DURING OPERATIONAL PHASE

The process description including quantum of pollution loads from liquid and solid waste considering their proposed environmental control measures has been discussed in **Chapter 2 - Project Profile**.

The operational impacts in this study have accordingly been evaluated for this project.

4.3.1 IMPACTS ON AIR QUALITY

4.3.1.1 Sources of Emissions

Stack emissions would be constituted of mainly Particulate matters (PM), SO₂ & NO_x.

In the existing project two (2) stacks are attached with the existing 1x3 T + 1X6 T + 2X15 T Induction Furnaces and 1x400 TPD DRI Plant. Three (3) stacks are attached with the units under implementation i.e. 3X15 T Induction Furnaces, 10 MW AFBC Plant & 1x0.3 MTPA Rolling Mill (Refer **Table-4.1 & 4.2**). The major source of continuous emission from the proposed expansion project will be from the thirteen (13) stacks. (Refer **Table-4.3**).

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TABLE-4.1
STACKS & EMISSION CHARACTERISTICS
FOR THE UNITS UNDER OPERATION

Description	Induction Furnaces (1x3 T + 1X6 T + 2X15 T)	DRI (1X400 TPD)
No. of Stack	1	1
Stack height (m)	32	50
Internal diameter at Stack Top (m)	2.0	2.2
Exit velocity of flue gas (m/s)	10.00	33.0
Temp. of flue gas degree (°C)	140	120
Temp. of flue gas degree (K)	413	393
Flue gas flow rate (Nm ³ /Hr)	81638	138066
PM emission rate(mg/Nm ³)	30	30
PM emission rate (gm/sec)	0.68	1.15
SO ₂ emission rate (mg/Nm ³)	-	100
SO ₂ emission rate (gm/sec)	-	3.84
NOx emission rate (mg/Nm ³)	-	100
NOx emission rate (gm/sec)	-	3.84

TABLE-4.2
STACKS FOR THE UNITS UNDER IPLEMENTATION

Description	Induction Furnaces (3x15 T)	AFBC Boiler (10 MW)	Rolling Mill (1x0.3 MTPA)
No. of Stack	1	1	1
Stack height (m)	30	50	30
Internal diameter at Stack Top (m)	1.1	1.8	1.0
Exit velocity of flue gas (m/s)	17.0	10.0	11.0
Temp. of flue gas degree (°C)	115	140	200
Temp. of flue gas degree (K)	388	413	473
Flue gas flow rate (Nm ³ /Hr)	44687	66127	19603
PM emission rate(mg/Nm ³)	30	30	30
PM emission rate (gm/sec)	0.37	0.55	0.16
SO ₂ emission rate (mg/Nm ³)	-	100	-
SO ₂ emission rate (gm/sec)	-	1.84	0.27
NOx emission rate(mg/Nm ³)	-	100	-
NOx emission rate (gm/sec)	-	1.84	0.27

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TABLE-4.3
STACKS FOR THE PROPOSED UNITS

Description	Sinter Plant (1x70 M²)	MBF (5,00,000 TPA)	DRI (1X650 TPD)	DRI (1X650 TPD)	DRI (1X650 TPD)	SAF (1x12 MVA)	SAF (1x12 MVA)	SAF (1x12 MVA)
No. of Stack	1	1	1	1	1	1	1	1
Stack height (m)	30.0	30.0	50.0	50.0	50.0	30.0	30.0	30.0
Internal diameter at Stack Top (m)	2.0	2.0	1.8	1.8	1.8	2.0	2.0	2.0
Exit velocity of flue gas (m/s)	12.5	15.0	12.0	12.0	12.0	10.0	10.0	10.0
Temp. of flue gas degree (°C)	130	150	140	140	140	90	90	90
Temp. of flue gas degree (K)	403	423	413	413	413	363	363	363
Flue gas flow rate (Nm ³ /Hr)	104580	119562	79352	79352	79352	92883	92883	92883
PM emission rate(mg/Nm ³)	30	30	30	30	30	30	30	30
PM emission rate (gm/sec)	0.87	1.00	0.66	0.66	0.66	0.77	0.77	0.77
SO ₂ emission rate (mg/Nm ³)	-	100	100	100	100	-	-	-
SO ₂ emission rate (gm/sec)	1.45	3.32	2.20	2.20	2.20	-	-	-
NO _x emission rate (mg/Nm ³)	-	100	100	100	100	-	-	-
NO _x emission rate (gm/sec)	1.45	3.32	2.20	2.20	2.20	-	-	-

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**TABLE-4.3 (Contd.)
STACKS FOR THE PROPOSED UNITS**

Description	AFBC (10 MW)	Electric Arc Furnaces (1x25 T)	Induction Furnaces (2x25 T)	Induction Furnaces (2x25 T)	Induction Furnaces (2x25 T)
No. of Stack	1	1	1	1	1
Stack height (m)	30.0	30.0	30.0	30.0	30.0
Internal diameter at Stack Top (m)	2.0	2.0	1.5	1.5	1.5
Exit velocity of flue gas (m/s)	12.5	15.0	12.0	12.0	12.0
Temp. of flue gas degree (°C)	130	150	95	95	95
Temp. of flue gas degree (K)	403	423	368	368	368
Flue gas flow rate (Nm ³ /Hr)	104580	119562	56656	56656	56656
PM emission rate(mg/Nm ³)	30	30	30	30	30
PM emission rate (gm/sec)	0.87	1.00	0.47	0.47	0.47
SO ₂ emission rate (mg/Nm ³)	100	-	-	-	-
SO ₂ emission rate (gm/sec)	1.45	-	-	-	-
NO _x emission rate (mg/Nm ³)	100	-	-	-	-
NO _x emission rate (gm/sec)	1.45	-	-	-	-

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4.3.1.2 Air Quality Dispersion Modelling

Selection of Model

The plant operation will emit gaseous pollutants through stack, which have the potential to deteriorate the air quality of the area. In order to evaluate the impact on ambient air quality due to such releases, the ground level concentrations (GLCs) as a result of the plant emissions have been evaluated through mathematical modelling using computer aided techniques.

Upon discharge to atmosphere, the emissions from sources are subjected to transport and diffusion processes which together are termed as dispersion. The processes which govern the atmospheric dispersion of pollutants are plume rise, transport by wind, and diffusion by turbulence and a number of physico-chemical processes such as gravitational settling, deposition, chemical reactions, transformation, decomposition and wash out.

The computation has been made applying **ISCST3 of USEPA**, which is most widely used and also recommended by **CPCB (PROBES/70/1997-98)**. The model is based on some assumption such as steady state conditions, continuous homogeneous flow, inert passive pollutants, no ground absorption and a Gaussian distribution of the plume in both horizontal and vertical planes.

4.3.1.3 Data Used for Modelling

The stack and emission data, as presented in **Tables-4.1** have been used as inputs to the model. The prediction of **GLCs** and corresponding impacts has been made for the emission figures mentioned therein.

The hourly meteorological data like ambient temperature, wind speed and wind direction used for air quality modelling have been taken from such data generated through continuous on-site monitoring during (**1st March, 2023 – 31st May, 2023**) representing the summer season.

The hourly occurrence of various atmospheric stability classes has been determined from the on-site hourly wind speed and cloud cover data using the insolation based stability classification.

The Mixing Height data were taken from one of the published documents i.e., **“Spatial Distribution of Hourly Mixing Depth over Indian Region”** of **R. N. Gupta**, applicable for project site. The mixing heights considered for modelling are given in **Table-4.4**.

TABLE - 4.4
MIXING HEIGHT

Hour of the day	Mixing Height (m)
	Summer Season
1	0
2	0
3	0
4	0
5	50
6	50
7	100
8	100
9	500
10	700
11	1000
12	1500
13	1500
14	1500
15	1500
16	1500
17	1500
18	1000
19	1000
20	700
21	500
22	100
23	50
24	0

4.3.1.4 Modelling Procedure

Modelling exercise has been performed for existing 3 stacks, 2 stacks for the units under implementation and proposed 13 nos. of stacks.

As recommended by CPCB, radial pattern of receptor locations has been implemented using the polar (r, θ) co-ordinate system with origin at the centre of the project site (i.e. Rolling Mill) of the Cartesian co-ordinate system. The locations of the receptors have then been defined with respect to 16 radial directions (N to NNW angle θ of such directions measured clockwise from North) and radial distance 'r' from the ARP.

The receptors are selected in such a way that more receptors are located close to the maximum concentration point. The maximum distance covered is 10 km., which has been seen adequate to cover the maximum concentrations for this particular situation.

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In order to compute the 24 hourly concentrations due to the operation of the proposed project, the hourly meteorological data recorded at the site meteorological observatory set up near the project site was used. The model was used to compute the 24-hour concentrations for each day for the winter season.

Modelling exercise has been performed for overall scenario:

4.3.1.5 Discussion on Modelling Results

The predicted maximum GLCs of SO₂, NO_x & PM are presented in **Table-4.5**. The isopleths of the three pollutants have been depicted in **Figures – 4.1** through **4.3** respectively.

TABLE – 4.5
PREDICTED MAXIMUM GLCs

Pollutants	Max. GLCs (µg/m³)	Direction	Distance (km)
Proposed Steel Plant for overall scenario :			
SO ₂	5.84	0.8	NNE
NO _x	5.84	0.8	NNE
PM	9.84	0.2	NNE

Hence, the maximum incremental value of SO₂, NO_x & PM would be about 5.84 µg/m³, 5.84 µg/m³ and 9.84 µg/m³ respectively, which will occur at a distance of 0.8, 0.8, 0.2 km in NNE direction.

The predicted GLCs of the pollutants at the respective eight (8) ambient air quality monitoring locations have been further superimposed on the corresponding background concentrations to get the resultant concentrations at those locations and have been presented in **Table-4.6**.

Table-4.6 : Prediction of GLCs
(All values in µg/m³)

Location Code	AAQM location	SO₂		
		Back Ground Maximum value	Predicted GLC(Max)	Over all scenario/ Net Impact
A1	Near Project Site(Benipur)	16	3.51	19.51
A2	Keliasota	11	1.86	12.86
A3	Tiltorya	13	1.66	14.66
A4	Madandi, Harmadih	17	1.63	18.63

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Location Code	AAQM location	SO₂		
		Back Ground Maximum value	Predicted GLC(Max)	Over all scenario/ Net Impact
A5	Goaladi	12	1.55	13.55
A6	Asanbani	13	1.23	14.23
A7	Saltore	12	2.36	14.36
A8	Deiliya	9	1.89	10.89
Norm		80.0		

Location Code	AAQM location	NO₂		
		Back Ground Maximum value	Predicted GLC(Max)	Over all scenario/ Net Impact
A1	Near Project Site(Benipur)	36	3.77	39.77
A2	Keliasota	24	1.00	25.00
A3	Tiltorya	26	0.98	26.98
A4	Madandi, Harmadih	33	1.16	34.16
A5	Goaladi	23	1.09	24.09
A6	Asanbani	32	0.99	32.99
A7	Saltore	35	2.13	37.13
A8	Deiliya	25	1.73	26.73
Norm		80.0		

Location Code	AAQM location	PM₁₀		
		Back Ground Maximum value	Predicted GLC(Max)	Over all scenario/ Net Impact
A1	Near Project Site(Benipur)	84	6.48	90.48
A2	Keliasota	74	1.88	75.88
A3	Tiltorya	78	1.76	79.76
A4	Madandi, Harmadih	87	1.92	88.92
A5	Goaladi	83	1.12	84.12
A6	Asanbani	75	1.84	76.84
A7	Saltore	82	3.35	85.35
A8	Deiliya	71	2.27	73.27
Norm		100.0		

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The above table reveals that the resultant GLCs are within the prescribed Norms for SO₂, NO_x & PM.

It may also be noted that the modelling results depict the worst case scenario as washout due to rain has not been considered and deposition on other forms of structures as buildings, trees etc. have not been taken into account. Thus, in actuality, the pollutant concentrations are expected to be relatively lower than the predicted value.

4.3.1.6 Impacts on Air Quality due to transportation of materials (Raw Materials, Products and Solid Wastes)

Presently, the background emissions in the project area are primarily due to emissions from traffic plying on the State Highway-5 in the vicinity of the site (about 3.0 km from the project site). During the operation phase of the proposed project, movement of goods' vehicles and loading and unloading operations may contribute to air emission. But with advanced and stringent traffic management system within the project site, scope for such emission will be minimized. The layout of the proposed project has generous area earmarked for greenery development. This will act as effective media for arresting the emissions within the project site.

The vehicular traffic plying in and out of the project site will be one of the significant sources of air pollution. If the site is not properly regulated, it can create disruption in free traffic movement leading to air pollution problems. This difficulty can be tackled to a great extent by properly regulating the traffic and by following strict and disciplined vehicular movement and operation in the project site. By imposing vehicular emission standards, this problem can be further curbed to a large extent. Adequate and planned road network will be set up in the proposed project for smooth movement of the goods vehicles.

The estimated quantity of raw materials, solid waste & products of the total project is as follows:

QUANTITY OF MATERIALS FOR TRANSPORTATION

Details of Unit	Materials
Raw Materials (TPA):	
Pellet & Iron Ore	1863290
Coke	85090
Coal	1017905
Limestone	55287
Dolomite	77720

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Details of Unit	Materials
Raw Materials (TPA):	
Querzite	26428
Quicklime	41764
Sponge Iron From Market	189080
Pig Iron	261782
Scrap	281838
Zinc	3500
Manganese Ore	230880
TOTAL (A)	4134564
Structural Steels	492000
Billets to Market	624830
DIP	500000
Ferro Alloys	88800
TOTAL (B)	1705630
Slag from MBF	200000
Slag from Induction Furnaces & Electric rc Furnaces	113500
Ferro Manganese Slag	88800
Tar from Producer Gas Plant	5280
Fly Ash from CPP	88800
Bottom Ash from CPP	22200
TOTAL (C)	518580
TOTAL (A+B+C)	6358774
Operating Days	330
Quantity (TPD)	19,269
Capacity of truck (tons)	30
Total Numbers of Trucks per day	642
Total Number of Trucks per hour	27

Thus, overall 63,58,774 TPA materials will be transported through road (considering 330 working days) for the entire plant. Thus, around 642 trucks per day (around 27 trucks per hour) will be required to transport the materials by road with the capacity of each truck being 30 Tons.

The emission of CO, HC, NO_x and PM from the trucks has been calculated for the proposed project, based on the emission factor in gm/km of Trucks / Trailer / Bus (Source: Central Pollution Control Board) (Ref. **Tables-4.7 & 4.8**).

Table-4.7
Emission Factors, (in gm/km)

Mode	CO	HC	NO _x	PM
Trucks / Trailer / Bus	4.5	1.1	8.0	0.36

Source: Central Pollution Control Board

Table-4.8
Daily Emission for Trucks

Parameters	Total Emissions for 642 trucks/day (in gm/km)
CO	2889
HC	706.2
NO _x	5136
PM	231.12

There will be some impact on the surrounding environment due to NO_x emission. The impact due to the emission of other pollutants will be insignificant. This quantum spread over the whole day is considered low and shall not make significant impact on the transportation route on the road.

Mitigation Measures

All trucks moving for transporting raw materials, solid waste & products shall be fully covered to avoid dust pollution.

With strict traffic management system and various environmental management practices, contribution of pollutants in the ambient air will be kept under control so as to create minimum disturbances in the neighbourhood.

The vehicular traffic plying in and out of the project site will also be one of the significant sources of air pollution. It will be mitigated by properly regulating the traffic and by following strict and disciplined

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vehicular movement and operation in the project site. Adequate and planned road network will be set up in the proposed project for smooth movement of the goods vehicles.

It would be ensured that all the vehicles plying in the working zone are properly tuned and maintained to keep emissions within the permissible limits. At loading and unloading points, arrangement for water sprinkling will be made so that dust generation during transportation of materials will be minimized further. All the internal roads within the plant shall be metalled; hence dust arising from the internal roads shall be insignificant. The greenbelt development shall further help in reduction in fugitive emissions.

With strict traffic management system and various environmental management practices, contribution of pollutants in the ambient air will be kept under control so as to create minimum disturbances in the neighbourhood.

4.3.2 Impacts on Water Quality

Company will follow “the zero waste water discharge concept” and the entire waste water will be recycled to the plant for various uses. As no waste water will be discharged outside the plant premises, there will be no impact on the water quality of any surface water body of the area.

4.3.3 Impacts on Hydrology and Water Use

The requirement of water for the overall projects will be around 3,834.5 m³/day, to be sourced from Damodar River through DVC supply.

Company will follow “the zero waste water discharge concept” and the entire waste water will be recycled to the plant for various uses. As no waste water will be discharged outside the plant premises, there will be no impact on any surface water hydrology of the area.

4.3.4 Impacts on Noise during Operation Sources of Plant Noise

The operation of the new units is expected to generate relatively high and continuous noise. However, attempts will be made to install machines which follow permissible noise limit as per Environment Protection Act.

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Impacts of Plant Noise

Operational activities are not expected to cause any undue disturbances to the people living in the proximate areas outside the plant boundary.

Impacts of noise on workers will be minimised through the adoption of adequate protective measures in the form of (a) use of personal protective equipment (ear plugs, ear muffs etc.), (b) education and public awareness, and (c) exposure control through the rotation of work assignments in the intense noise areas.

As such, due to protection, there will not be any appreciable impact from noise due to the operation of the new projects.

4.3.5 Impacts on Soil

As discussed in chapter-2.0, all solid waste that would be generated during the plant operation, will be managed in the proper manner. This will ensure that there will not be any impact on soil quality due to the disposal or deposition of solid wastes.

4.3.6 Impacts on Land Use

The proposed development will take place inside the acquired land area, so there will not be any impact on the land use pattern outside the plant area.

4.3.7 IMPACTS ON ECOLOGY

Impacts on Terrestrial Ecology

The baseline status of terrestrial flora and fauna within the study area have been drawn up earlier. The harmful effects of such air pollutants as SO₂, NO_x, & PM in affecting growth and other similar functions of trees, either singularly or synergistically is well known. However, such effects are experienced only at high levels. During the operation of the proposed project, the significant pollutants will be SO₂, NO_x, & PM to be discharged from the six stacks. The maximum incremental values of SO₂, NO_x, & PM for the proposed units would be about 5.84 µg/m³, 5.84 µg/m³ and 9.84 µg/m³ respectively, which will occur at a distance of 0.2 to 0.8 km in NNE direction respectively which is insignificant and is not envisaged to cause any stress on the ecological fabric of the study area. The greenbelt proposed would be useful in controlling fugitive emissions and process noise from disturbing ecological environment in the study area.

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Impact on Aquatic Ecology

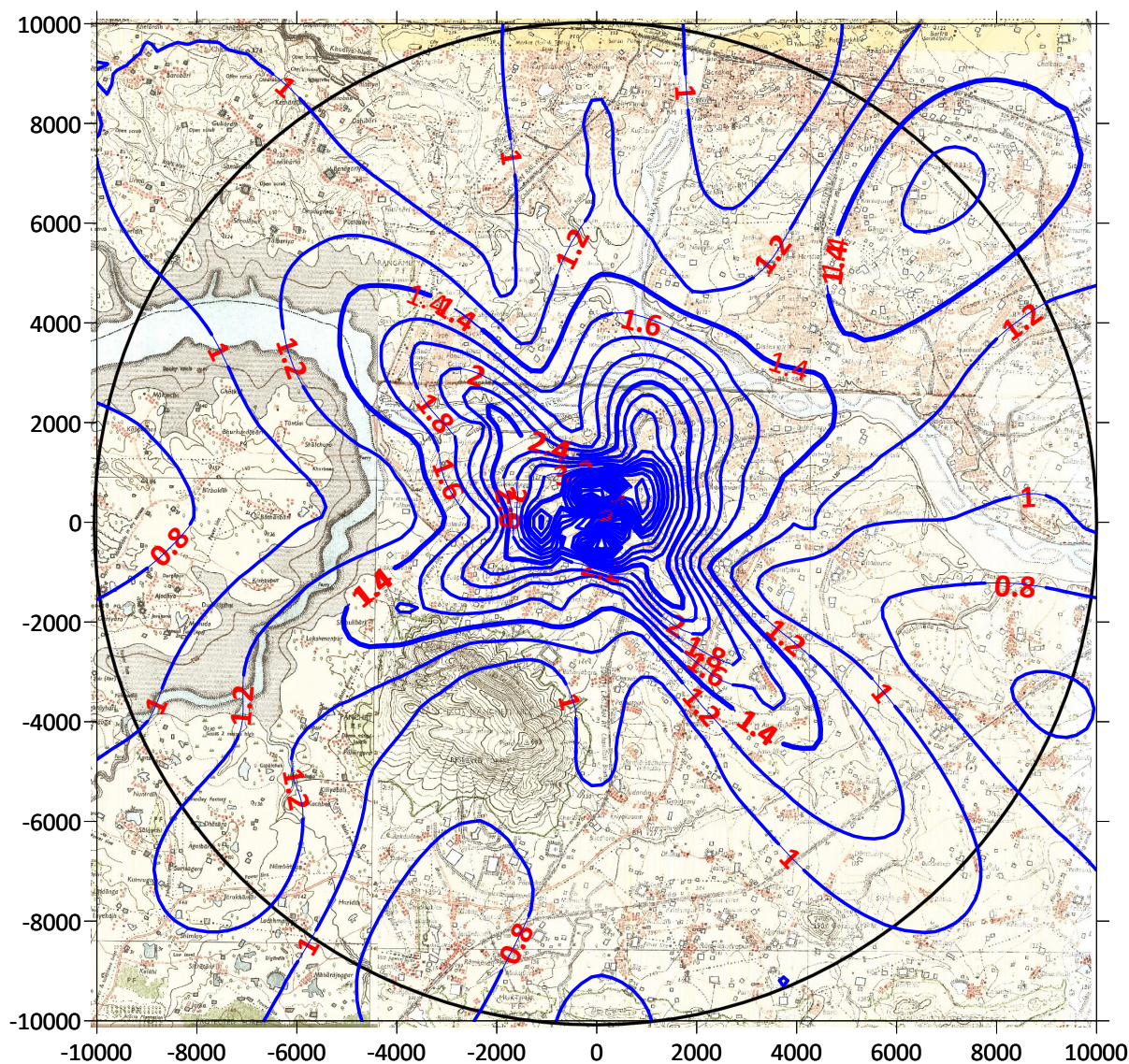
Effluent from the proposed project will be totally re-used after necessary treatment. As such, no impact on aquatic ecology is envisaged due to operation of this project.

Moreover, there will be adequate greenbelt inside the plant area, which will further ameliorate the ecological condition of the area.

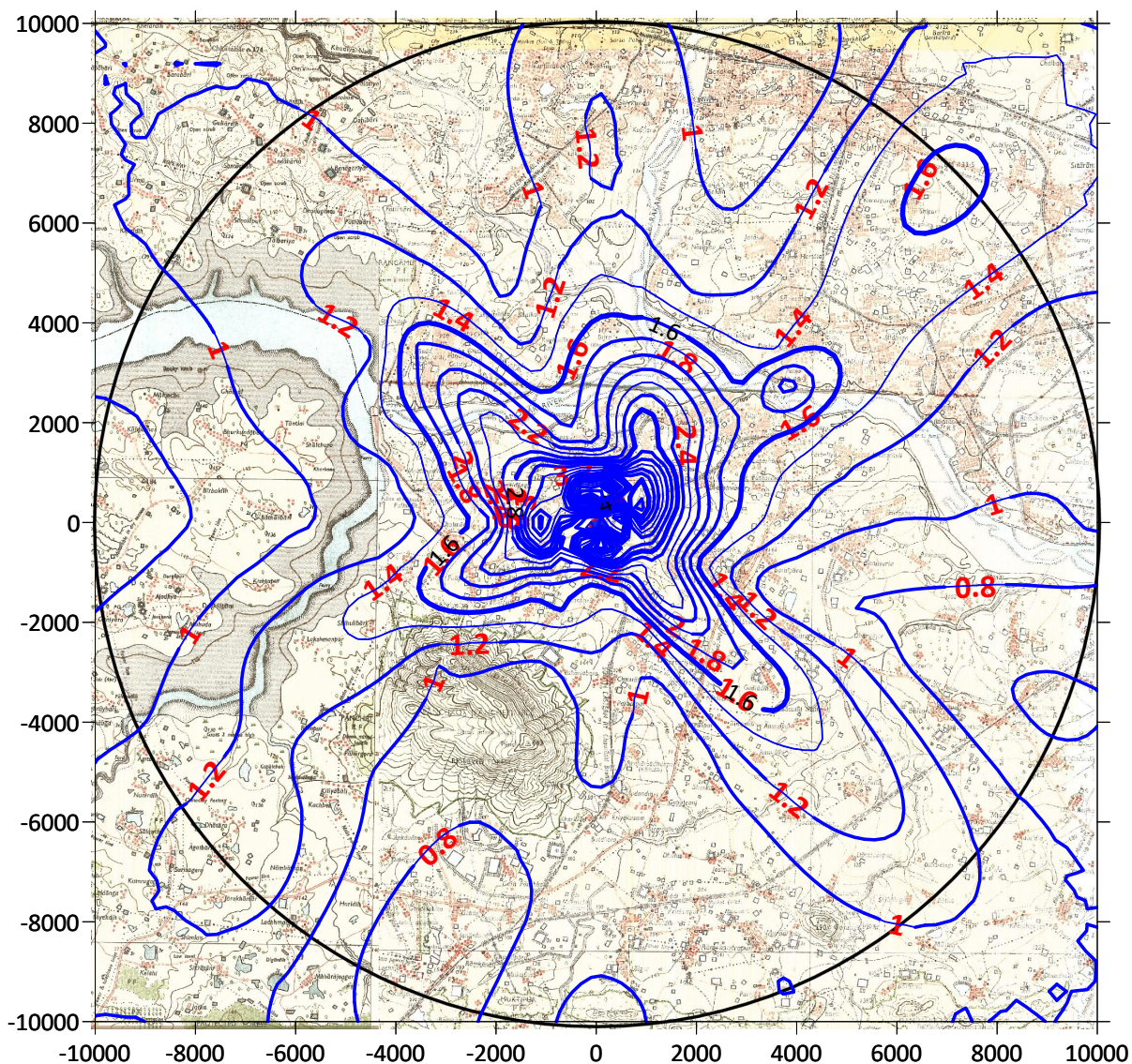
4.3.8 Impacts on Demography and Socio-economics

The labour force involved during construction phase will be replaced by more skilled manpower to operate and maintain the plant.

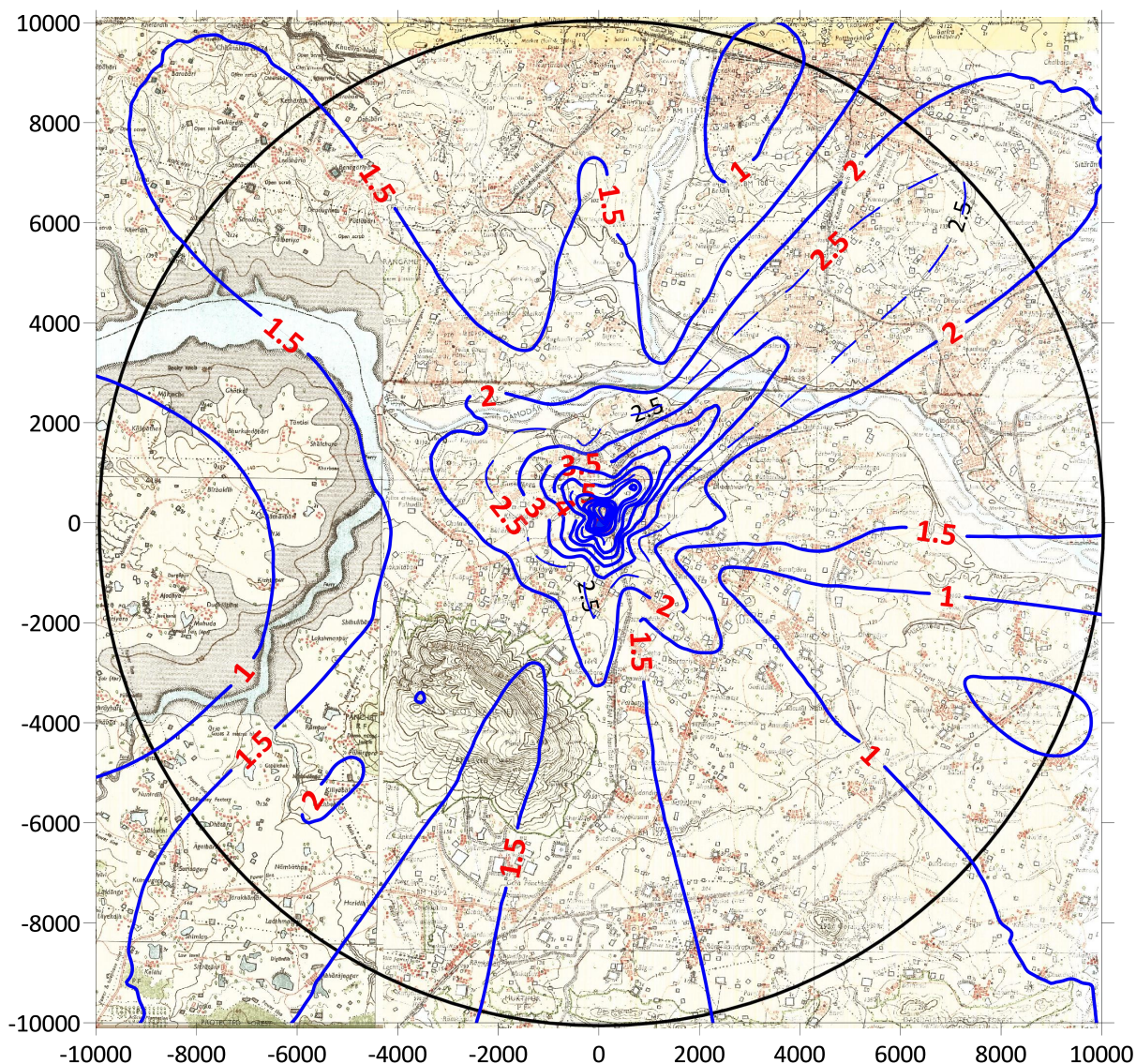
As the area is close to Purulia & Asansol, skilled people from the town will be available to work here. So, there will be no major change of local occupational scenario, though the establishment of the new project will increase the direct and indirect jobs and other economic opportunities. There will be some development of secondary service market, which will result in growth in the local economy.



**FIGURE-4.1
ISOPLETHS OF SO₂**



**FIGURE-4.2
ISOPLETHS OF NO_x**



**FIGURE-4.3
ISOPLETHS OF PM**

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CHAPTER-5.0

ANALYSIS OF ALTERNATIVES

M/s AIC Iron Industries Private Limited proposes to expand its existing steel plant at village: Benipur, P.O.: Saltor, P.S.: Neturia, Dist: Purulia, West Bengal. The proposed expansion project will be installed on the available land within the existing plant premises as well as on some adjoining land, comprising of total 30.25 Hectares (74.74 Acres).

The proposed project is the expansion of the existing project so it is proposed within the existing plant site for the overall integration.

So, no alternative site has been explored.

Following are some of the advantages of the proposed expansion project at the existing project location:

- Availability of the additional land within the existing project site as well as in the adjoining area
- Proper integration of the respective units in terms of the quantum of various Raw materials as well as products & by-product.
- Availability of water through existing system of Rain Water Harvesting and also from DVC water supply system.
- Availability of power from Captive Power Plant and balance from Damodar Valley Corporation (DVC).
- Integration of the available of existing logistics & utilities to ultimately minimise the overall requirement of the land and other natural resources.

Manufacturing technologies for all the units proposed in the project are well proven technologies all over the world. M/s AIC Iron Industries Private Limited proposed project will follow the Best Available Technology.

No Project Scenario:

The proposed project will offer various benefits to the society. However, it will result in insignificant impact on the respective environmental attributes. All possible mitigation measures by adopting the state-of-the-art technology will ultimately ensure a sustainable development. An analysis of “No Project Scenario” has been undertaken and the same has

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been presented below in Tabular form:

SL. NO.	ATTRIBUTES	PROJECT SCENARIO	NO PROJECT SCENARIO	REMARKS
1	LAND USE	Change	No Change	-
2	AIR ENVIRONMENT	Insignificant Impact	No Impact	Emissions due to project will be controlled properly ultimately resulting in insignificant impact on Air Environment.
3	WATER ENVIRONMENT	Increase in water requirement	No change in water requirement	Fresh water requirement will be minimal by adopting recycling & various water conservation measures.
		Effluent generation	No Effluent generation	Zero Liquid Discharge (ZLD) concept shall be adopted.
4	BIOLOGICAL ENVIRONMENT	Insignificant Impact	No Impact	All mitigation measures shall be adopted to minimize the project impact.
5	SOCIO-ECONOMIC ENVIRONMENT	Beneficial Impacts	No Impact	The project will offer various socio-economic benefits
6	EMPLOYMENT GENERATION	Beneficial Impacts	No Impact	The project will generate considerable job opportunities - both Direct & Indirect.
7	INVESTMENT	Beneficial Impacts	No Impact	Increase in Government revenue as well as multiple benefits to the society.

Conclusion:

The existing project site at village: Benipur, P.O.: Saltor, P.S.: Neturia, Dist: Purulia in West Bengal emerges as most suitable site w.r.t the land availability, proximity & best accessibility of water and power sources, moreover this site is nearest to the important Road and Rail. It is substantially advantageous in terms of environmental and technical criteria.

CHAPTER-6.0

ENVIRONMENTAL MONITORING PROGRAMME

6.1 INTRODUCTION

Environmental monitoring is the repetitive and systematic measurement of the characteristics of environmental components to test specific hypotheses of the effects of human activity on the environment. The post project environmental monitoring program serves as the key tool to keep track on performance of mitigation measures implemented & pollution control technologies installed to prevent impacts associated with various operations of the project.

Thus, environmental monitoring is the effective observation of site conditions and work activities; and identification of potential non-compliance situations and initiation of corrective or remedial actions. Monitoring is as important as that of control of pollution, since the efficiency of control measures can only be determined by monitoring.

6.2 ENVIRONMENTAL MONITORING PROGRAMME

Monitoring of the following aspects is important to keep a constant check on the environmental performance of the project and also the environmental quality of the area.

- Ambient Air Quality
- Stack Emission
- Work zone Air quality,
- Water Quality
- Waste water Quality
- Drinking Water Quality
- Noise Level
- Plantation Condition
- Periodic Preventive Maintenance
- Occupational Health & Safety Monitoring
- Fire Safety Monitoring

Ambient Air Quality

Ambient air quality monitoring will be conducted at 3 locations (120 degree to each other) around the project site for relevant parameters as per frequency stipulated in NAAQS 2009. The parameters, to be monitored include PM₁₀, PM_{2.5}, SO₂ and NO_x.

Fugitive emissions of PM₁₀ will be monitored with a frequency of twice a week inside the project area where fugitive dust emissions are anticipated like the raw material handling area (unloading and storage), truck movement and parking areas, solid wastes storage area, to ensure that air pollution control measures are working properly.

Table 6.1: Air Pollutant Measurement Technique

Sl. No.	Parameter	Technique	Technical Protocol Minimum Detectable
1	Respirable Particulate Matter (PM ₁₀)	Respirable Dust Sampler (Gravimetric Method)	IS 5182 (Part 23) : 2006 Reaffirmed 2012
2	PM _{2.5}	Fine Respirable Dust Sampler (Gravimetric Method)	CPCB method -
3	Sulphur Dioxide	Modified West & Gaeke method	IS 5182 (Part 2) : 2001 Reaffirmed 2012
4	Oxides of Nitrogen	Jacob & Hochheiser method	IS 5182 (Part-6): 2006 Reaffirmed 2012

Stack Emissions

In the proposed expansion project, units will have number of stacks for dispersing gaseous pollutants. All the emissions from these stacks will have to be monitored. Periodic monitoring of stack emission by stack monitoring kit will be carried out. Online Continuous Emission Monitoring System will be installed at relevant stacks.

Table 6.2: Stack Measurement Technique

Sl. No.	Parameter	Technique	Technical Protocol Minimum Detectable
1	Particulate Matter	Gravimetric Method	IS 11255 (Part 1) : 1985 Reaff. 2014
2	Sulphur Dioxide	IPA – Thorin method	IS 11255 (Part 2) :1985 Reaff. 2014
3	Oxides of Nitrogen	Phenol di-sulphonic acid method	IS 11255 (Part 7): 2005 Reaff. 2012

Ground Water Quality

Ground water will be monitored inside the project site, near solid wastes storage area by installing a piezometer. Groundwater quality monitoring will be also done at nearby villages (3 villages located along the boundary of plant). The monitoring will be carried out with a frequency of twice in a year.

Waste water Quality

Zero waste water discharge has been planned for the proposed expansion project. There will be waste water treatment plant and final treated waste water after treatment will be reused. Yet the waste water quality before use will be regularly monitored on monthly basis.

Meteorology

A meteorological station will be set-up at the project site for the record of meteorological parameters such as wind velocity and direction, ambient temperature, atmospheric pressure, relative humidity and rainfall.

Noise

Noise monitoring will be carried out inside the work area of each plant and near the high noise generating areas, at plant boundary and outside the project site at nearby villages twice in a year.

Plantation

The project proponent will depute trained people to look after and record the conditions of tree plantation and greening of the project area.

Periodic Preventive Maintenance

All instruments installed or used for monitoring and recording of working environment parameters will be regularly tested and calibrated, and the respective records maintained;

Occupational Health & Safety Monitoring

The occupational health and safety monitoring program shall include safety inspection, testing and calibration. Project proponent shall carryout inspection and testing of all safety features and hazard control measures for plant operation. This shall include regular inspection and testing of all safety features and hazard control measures focusing on engineering and personal protective features, work procedures, places of work, installations, equipment, and tools used. The inspection shall verify that issued personal protective equipment (PPE) continues to provide adequate protection and is being worn as required.

Conclusion

The post project monitoring programme, consisting of various disciplines, no. of locations, parameters, frequency of monitoring along with the fund provision for the proposed project has been presented in **Table-6.3**.

However, the monitoring programme w.r.t. the frequency and the sampling locations will be finally decided in consultation with the State Pollution Control Board and Regional Office of the MoEF&CC.

TABLE-6.3
POST PROJECT MONITORING PROGRAMME

Discipline	Locations	Parameters	Frequency	Fund Provision (Annual Cost in Lakhs)
Meteorology (Met Station)	One	Temperature, Rainfall, Relative Humidity, Atmospheric Pressure, Wind Speed and Direction	Hourly	2 lakhs
Ambient Air Quality	3-4 relevant locations	PM ₁₀ , PM _{2.5} , SO ₂ & NO ₂	Twice in a week	16 lakhs
Stack Emission	Each Unit	PM, SO ₂ & NO _x	Quarterly	7 lakh
Fugitive Emission	3-4 relevant locations	PM	Quarterly	3 lakh
Effluent	Process Effluent	pH, Total Suspended Solid, Temperature, Oil &	Every 2 months	2 lakh

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		Grease, Copper, Iron & COD		
Ground Water Quality	3-4 Locations	pH, Temperature, Conductivity, Turbidity, Alkalinity, Chlorine, Total Suspended Solid, Total Dissolved Solids, Total Hardness, Ca-hardness, Mg-hardness, Coliform, Fe, Cu, Cd, Cr ⁶⁺ , Pb, As, Hg, Zn	Twice in a year	3 lakh
Noise	Plant Area and Nearby villages	Day and Night Time Noise Levels	Half-yearly	1 lakh
TOTAL				34 lakhs

6.3 PERFORMANCE MONITORING OF POLLUTION CONTROL DEVICES:

M/s. AIC Iron Industries Pvt. Ltd. will continuously monitor the performance of pollution control devices through its process, experienced engineers & good preventive maintenance system. Performance of pollution control system will be monitored by operator & maintenance staff through pressure drop measurement system. Bag filters will be equipped with U-tube manometer & Electronically operated differential pressure switches. If it crosses its acceptable limit then operator will get alarm of failure. In case of failure, Operator will take immediate action by stopping the particular machine & inform maintenance dept. for necessary corrections.

In the project, for better working environment the company will use maximum nos. of pollution control devices like Cyclone/spark arrester/bag filter/ Electrostatic precipitators etc.

PERFORMANCE MONITORING OF BAG FILTERS

Commonly known as bag houses, bag filters are one of the most efficient and cost effective types of dust collectors available and can achieve a collection efficiency of more than 99% for very fine particulates.

Table 6.4
Typical preventive maintenance procedure
and performance monitoring for bag filters

Frequency	Procedure
Daily	Check pressure drop
	Observe stack (visually)
	Walk through system.
	Check for unusual occurrences in process
	Observe control panel indicators
	Check compressed-air pressure
	Assure that dust is being removed from system
Weekly	Operate damper valves
	Check compressed-air lines.
	Check that valves are opening and closing properly in bag-cleaning sequence.
	Verify accuracy of temperature-indicating equipment
	Check pressure-drop-indicating equipment
Monthly	Check all moving parts in shaker mechanism
	Inspect fans for corrosion and material build up
	Check drive belts for wear and tension
	Inspect and lubricate appropriate items
	Spot-check bag tension
	Spot check for bag leaks
	Check hoses and clamps
	Check accuracy of indicating equipment
	Inspect housing for corrosion
Quarterly	Inspect baffle plate for wear
	Inspect bags thoroughly
	Check duct for dust build up
	Observe damper valves for proper seating
	Check gaskets on doors
	Inspect paint, insulation, etc.
	Check RAV for wear or abrasion
	Check fan belts
Annually	Check welds
	Inspect hopper for wear

Maintenance team of the company will continuously work for better performance of APC devices by maintaining proper schedule for maintenance to achieve pollution free working environment.

CHAPTER-7.0

ADDITIONAL STUDIES

(HAZARD IDENTIFICATION & RISK ASSESSMENT, DISASTER MANAGEMENT PLAN & PUBLIC CONSULTATION)

7.1 INTRODUCTION

Considering the generic structure of the EIA/EMP report prescribed in EIA Notification dated 14.09.2006, this chapter comprises of public consultation, Risk Assessment, social impact assessment and R&R Action plan.

This chapter deals with identification of the potential hazards and disaster and preventive measures for disaster. The proposed project may encounter with certain types of hazards which can disrupt normal activities suddenly and lead to disaster like fires, inundation, failure of machinery, hot metal spill, electrocution, to name a few. Disaster management plan has been formulated with an aim of taking precautionary step to control the hazard propagation and ward off disaster and also to take such action after the disaster which minimize the damage.

Industrial activities, involved in producing, treating, storing and handling of hazardous substances, have a high hazard potential to safety of man and environment at work place and outside. Recognising the need to control and minimize the risks posed by such activities, the Ministry of Environment, Forest and Climate Change (MoEF&CC) has notified the “Hazardous and other wastes (Management and Transboundary Movement) Rules in the year 2016 (In super session of the Manufacture, Storage, Handling and Transboundary Movement and Hazardous Waste Rules, 2008). For effective implementation of the rule, Ministry of Environment, Forest and Climate Change has provided a set of guidelines. The guidelines, in addition to other aspects, set out the responsibilities/duties needed to be performed by the occupier along with the procedure. The rule also lists out the industrial activities and chemicals, which are needed to be considered as hazardous.

The proposed activities are scrutinized in line with the above referred “Manufacture, storage and import of hazardous chemicals rules” and observations/findings are presented in this document.

Steel plant involves hazardous processes, which can result in significant risk to the work environment and hence needs proper assessment.

During the manufacturing process of the proposed expansion project, the major substances to be handled/stored include Iron ore, Pellet, Coal etc. and fluxes such as dolomite etc. Besides, hot metal in SMS, hot flue gas in DRI and steam in Captive Power plant shall be handled. The major chemicals to be handled/stored include HSD, FO etc.

7.2 HAZARD IDENTIFICATION AND RISK ASSESSMENT

Hazard is a source or situation that has the potential for harm in terms of ill health, human injury, damage to property or the environment, or a combination of these factors. It has got both short and or long term effect on the work environment with considerable human and economic costs. A hazard may have a potential to create an emergency like situation at the work place. Hazard is a potential cause to lead to a disaster.

Hazards exist almost in every workplace in different forms and required to be identified, analyzed / assessed and controlled regarding the work processes, plant or substances. They arise from (i) workplace environment, (ii) use of plant and equipment (iii) use of substances & materials, (iv) poor work or plant design, (v) improper management systems and work procedures, and (vi) human behaviour.

Steel plants have several hazardous processes and operations which can cause considerable environmental, health and safety risk to the workforce. All the hazards cause potential risk to the work environment which include work force and work place and hence need proper assessment.

M/s AIC Iron Industries Private Limited has decided to expand its activity by installation of 1X0.5 MTPA capacity Sinter Plant,

1X500 M³ capacity MBF, 3x650 TPD DRI Kilns (6,43,500 TPA Sponge Iron), 6x25 T Induction Furnaces, 1x25 T Electric Arc Furnaces along with 1x15 TPH Slag Crusher unit, Enhancement (through optimization in operation) the production capacity of 4x15 T + 2X10 T Induction Furnaces (as per EC 2010 & 2023), 3x12 MVA capacity Submerged Arc Furnaces, 1x0.3 MTPA capacity Rolling Mill, Lime Plant (250 TPD), Oxygen Plant (225 TPD), 1x0.5 MTPA capacity Ductile Iron Pipe (DIP) Plant, 60,000 TPA capacity Galvanising Unit along with 4x4000 Nm³/Hr capacity Producer Gas Plant and 100 MW capacity Captive Power Plant (70 MW WHRB + 30 MW AFBC/CFBC) within the existing plant premises at Village - Benipur, P.O.: Saltor, Dist. Purulia in West Bengal.

The proposed plant has lower risk potential than those industries which deal with toxic and flammable chemicals. Off-site people are not exposed to any threat, hence the societal risk is insignificant.

This is an early check of major hazards, which are of risk potential - including the potential for disastrous interactions of the various plant operational activities. This checklist, though not strictly speaking a Hazard and Operability Study (HAZOP) would considerably facilitate a full scale HAZOP Study for final drawing up of risk management measures when the 'design-freeze' stage commences. The identification of hazards anticipation for the proposed project activities are presented below in **Table-7.1**.

TABLE 7.1
HAZARD IDENTIFICATION OF THE PROJECT

Item	Nature of Hazard	Hazard Potential
Raw Material Handling:		
Iron Ore Fines, Dolomite, Ferro-Alloys, etc.	Dust	Minor
Coal (Non-coking)	Heat, Fire & Dust	Moderate
HSD/ Lube Oils / Greases	Heat & Fire	Major
Production Units:		
Sinter Plant	Fire, Heat & Dust	Moderate
MBF	Fire, Heat & Dust	Major
Sponge Iron Plant	Fire, Heat & Dust	Moderate
Steel Making Facilities : Induction Furnaces & Electric Arc Furnaces	Heat & Fire by Hot Metal & Slag Handling	Major
Ferro Alloy Plant	Heat & Dust	Moderate

DIP	Heat & Dust	Moderate
Hot Rolling Mill	Heat	Moderate
Captive Power Plant	Fire, Heat & Dust	Moderate
Utilities :		
Fuel (Gas / Liquid)	Heat & Fire	Major
Electric Power Supply	Heat & Fire	Minor

The Brief about nature of various Hazards in M/s AIC Iron Industries is given below,

Brief of Nature of Hazard in the Project

NATURE OF HAZARD	SOURCES
Fire Hazard	Release / leakage of CO gas, BF gas and Hot Liquid metal. Fire in HSD storage.
Explosion Hazard	Release / leakage of CO gas, BF gas gas, DRI Waste gas.
Fire / Explosions due to Spillage of Liquid Steel	Spillage / Transfer of liquid metal, liquid steel and hot slag.
Heat Radiations due to Hot Metal Handling	Spillage of liquid metal, liquid steel and hot slag.
Accidents due to Material Handling Equipment	Connected with all Material Handling Equipment

(a) Splashing of molten metal & solid waste : Sudden break out of molten metal and slag have been known to take place during furnace operation. The break out may take place from weak portions of the hearth. The spillage of hot metal or slag can lead to severe burn injuries and fires. Explosions may also happen as a result of hot metal or slag falling in a pool of water resulting in human injuries and fire due to flying hot splinters and splashing of hot metal or slag. The spillage of hot metal can also take place be due to hearth breakage, mould breakage and during transportation. The accidents can also occur due to failure of water-cooled panels, puncture in water-cooled lances, leakage of

water from the walls of mould. Through checks in regular intervals and proper upkeep of furnace refractory and cooling panels, such incidents can be avoided.

The consequences may result in death (in extreme case), severe burn and mechanical injury and will be limited to working personnel near the site of incident.

(b) Dust and fumes: Dust and fumes will be generated at many points in the steel plant.

Silica exposure is a risk to workers engaged in lining, relining and repairing of induction furnaces and vessels with refractory materials. Ladles are lined with fire-brick or bonded crushed silica and this lining requires regular repair. The silica contained in the refractory materials (is partly in the form of silicates), which do not cause silicosis but rather pneumoconiosis. The Workers are seldom exposed to heavy clouds of dust.

Additions of alloy to furnaces for making special steels sometimes bring potential exposure risks from chromium, manganese, lead and cadmium.

(c) Rolling Mill: Severe injuries may occur in hot rolling, if workers try to cross roller conveyors at unauthorized points. Looping and lashing may cause extensive injuries & burns, or even severing of lower limbs. The use of bulk quantities of oils, rust inhibitors and so on, which are generally applied by spraying, is another hazard commonly take place in rolling mill. In spite of taking the protective measures to confine the sprayed products, they often collect on the floor and on communication ways, where they may cause slips and falls.

Accidents may also occur in automated works during changing heavy rollers in the stands.

Tongs used in gripping of hot material may knock together; the square spanners used to move heavy rolled sections by hand may cause severe injuries to the head or upper torso by backlash. Many accidents may be caused by faulty lifting and handling and by faults in cranes and lifting tackle. Many accidents are caused

through trips and stumbles or badly maintained floors, by badly stacked material, by protruding billet ends and cribbing rolls and so on.

In hot rolling, burns and eye injuries may occur by flying mill scale; splash guards can effectively reduce the ejection of scale and hot water. Eye injuries may take place by dust particles or by whipping of cable slings; eyes may also be affected by glare.

Considerable noise develops in the entire rolling zone viz., from the gearbox of the rolls and straightening machines, from pressure water pumps, from shears and saws, from throwing finished products into a pit and from stopping movements of the material with metal plates.

Cleaning of the finished products with high-speed percussion tools may lead to arthritic changes of the elbows, shoulders, collarbone, radius joint and distal ulna, as well as lesions of the navicular and lunatum bone.

(d) Carbon monoxide exposure: In the blast furnace, large quantity of blast furnace gas (which also includes 22 to 23% carbon monoxide) will be produced in the process of manufacturing. After the dust is removed, these gases will be used as fuel sources in different units. The Blast Furnace gas is odorless, poisonous and inflammable because of large amount of carbon monoxide.

Carbon monoxide sometimes emanates or leaks from the tops or bodies of blast furnaces or from the many gas pipelines inside plants, accidentally causing acute carbon monoxide poisoning. Any leakage of the gas and subsequent ignition may cause explosion / fire. Inhalation of the gas may also lead to death. Most cases of such poisoning occur during work around blast furnaces, especially during repairs. Other cases take place during work around the hot stoves, tours of inspection around the furnace bodies, work near the furnace tops or work close to cinder notches or the tapping notches. Carbon monoxide poisoning may also result from gas released from water-seal valves or seal pots; from sudden shutdown of blowing equipment, boiler rooms or ventilation fans; from leakage; from failure in proper ventilation or

purge process vessels, pipelines or equipment prior to work; and during closing of pipe valves.

7.2.1 APPROACH TO THE STUDY

Risk involves the occurrence or potential occurrence of some accidents consisting of an event or sequence of events. The risk assessment study covers the following:

1. Identification of potential hazard areas;
2. Identification of representative failure cases;
3. Assess the overall damage potential of the identified hazardous events and the impact zones from the accidental scenarios;
4. Assess overall suitability of the site from hazard minimization and disaster mitigation point of views;
5. Provide specific recommendations on the minimization of the worst accident possibilities; and
6. Preparation of elaborated Disaster Management Plan (DMP), on-site & off-site emergency plan, which includes occupational and health safety plan.

7.3 HAZARD ASSESSMENT AND EVALUATION

7.3.1 METHODOLOGY

The hazards expected from this plant include the pool fire situation due to the leakage of HSD storage tanks. There will be total 2 nos. of storage tanks, 2X25 KL for HSD. The tanks (made of mild steel), will be provided with dyke. The worst case can be assumed when the entire content leak out into the dyke forming a pool, which may catch fire after getting source of ignition.

HSD STORAGE TANKS - POOL FIRE SCENARIO:

The maximum quantity of HSD stored at site are 50 KL capacity. In the event of oil spillage through a small leakage, fire will occur after getting ignition source. As the tanks are provided with dyke, the fire will be limited within the dyke. The threshold limit for first degree burns is 4.5 kw/m². Based on these results it can be concluded that the vulnerable zone in which the thermal fluxes

higher than the threshold limit for first degree burns (4.5 kW/m^2) is restricted to 2.26 m.

The hazard distances for various radiation intensities are shown in **Table 7.2**.

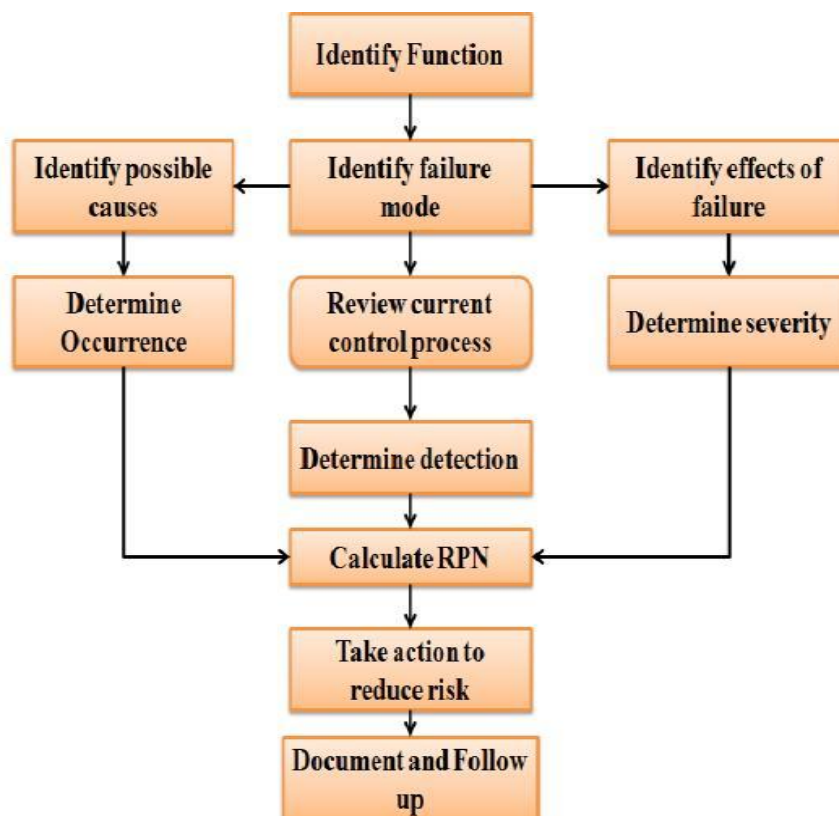
TABLE-7.2
HAZARD DISTANCES DUE TO HSD TANK ON FIRE
(HSD Tank: 2x25 KL)

Thermal Radiation Intensity (in kW/m^2)	Damage to People	Hazard Distances (in m)
37.5	100% lethality	0.71
25.0	50% lethality	0.92
12.5	1% lethality	1.53
4.5	1 st degree burns	2.26

The hazard distances for Thermal radiation are confined only to the plant premises. Hence, there will not be any thermal radiation impact on outside population due to the pool fire scenario.

7.4.4 FAILURE MODE EFFECT ANALYSIS FOR PROCESS UNITS

Failure mode effects analysis (FMEA) is one of the most important and widely used tools for reliability analysis. FMEA identifies corrective actions, which are required to reduce failures to assure the highest possible yield safety and reliability. Even though it is a widely used reliability technique, it has some limitations in prioritizing the failure modes and output may be large for even simple systems, which may not deal easily with time sequence, environmental and maintenance components.

Figure – 7.1: Steps in FMEA**7.4.4.1 RISK PRIORITY NUMBER**

Risk priority number (RPN) methodology is a technique for analysing the risk associated with potential failures during a FMEA analysis. To calculate risk priority number, severity, occurrence and detection are the three factors, which need to be determined.

$$\text{RPN} = (\text{Severity} \times \text{Occurrence} \times \text{Detection})$$

7.4.4.2 SEVERITY (S)

Severity is the seriousness of the effect of potential failure modes. Severity rating with the higher number represents the higher seriousness or risk which could cause death.

Table-7.3: Example Table of Severity

Rating	Detection	Detection by design control
10	Absolute uncertainty	Design control cannot detect failure mode
9	Very remote	Very remote chance the design control detect failure mode
8	Remote	Remote chance the design control detect failure mode
7	Very low	Very low chance the design control detect failure mode
6	Low	Low chance the design control detect failure mode
5	Moderate	Moderate chance the design control detect failure mode
4	Moderately high	Moderately high chance the design control detect failure mode
3	High	High chance the design control detect failure mode
2	Very high	Very high chance the design control detect failure mode
1	Almost certain	Design will control detect failure mode

7.4.4.3 OCCURRENCE (O)

Occurrence ratings for FMEA are based on the likelihood that a cause may occur based on past failures and performances of the similar system in the similar activity. Occurrence values should contain data to provide justification.

Table – 7.4 : Example table of Occurrence

Rating	Classification	Example
10 9	Very High	Inevitable failures
8 7	High	Repeated failures
6 5	Moderate	Occasional failures
4 3	Low remote	Few failures
2 1	Remote	Failures unlikely

7.4.4.4 DETECTION (D)

Detection is an assessment of the likelihood that the current controls will detect the cause of failure mode.

Table – 7.5: Example Table of Detection

Ranking	Effect	Severity effect
10	Hazardous without warning	Very high severity without warning
9	Hazardous with warning	Very high severity with warning
8	Very high	Destructive failure without safety
7	High	System inoperable equipment damage
6	Moderate	System inoperable with minor damage
5	Low	System inoperable without damage

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4	Very low	Degradation of performance
3	Minor	System operable with some degradation in performance
2	Very minor	System operable with minimal interference
1	None	No effect

7.4.4.5 FMEA IMPLEMENTATION

Failure mode effect analysis is executed by a multidisciplinary team of experts with the help of process flow chart. Criteria of ranking of severity, occurrence and detection are selected based on the past failure records of the furnace. Risk priority number (RPN) is calculated using values of severity, occurrence and detection number.

TABLE - 7.6
RPN for proposed expansion project
with Propose Control Measures

Components/ Process	Failure Mode	Failure Effect	Failure Cause	Existing Control	S	O	D	RPN	Additional Control
SINTER PLANT									
Conveyor feed belt to sinter plant	Friction	Fire	Improper Maintenance	-	9	2	2	36	Lubricating the rotating parts regularly
Pneumatic lime transportation system	Failed to Operate	Spillage of Hot Lime	Improper Maintenance	-	7	2	2	28	Regular inspection and Periodic maintenance
Automatic lubricating system	Failed to Operate	Mechanical Failure	Improper Maintenance	-	4	3	3	36	Periodic Maintenance
Double cone dust valves	Failed to Operate	Improper dust cleaning	Corrosion	-	3	2	3	18	Periodic Maintenance
Mixed gas injection	Pipeline rupture	Fire & Explosion	Over Pressure	-	5	2	3	30	Provide detectors with alarm system
Sinter Cooler	Failed to Operate	Combustion failure in Sinter	Improper Maintenance	-	4	3	3	36	Regular inspection and Periodic maintenance
BLAST FURNACE									
Bleeder valves	Failed to Operate	Explosion	Corrosion	-	9	2	3	54	Periodic Maintenance

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Conveyor feed belt	Friction	Fire	Improper Maintenance	-	8	2	3	48	Lubricating the rotating parts regularly
Cold blast Blower	Flow Pressure Increase	Rupture in stove	Failure of valves	-	8	2	2	31	Interlock system
Hot blast Blower	Stove shell crack	Fire & Explosion	Excess Temperature	-	9	1	2	18	Periodic Maintenance
Blast Furnace gas	Pipeline rupture	CO poisoning	Over Pressure	-	10	3	2	60	Provide detectors with alarm system
Oxygen Injection	Pipeline rupture	Fire & Explosion	Over Pressure	-	9	2	2	36	Provide detectors with alarm system
Cooling water supply pump	Pump failure	Explosion	No power supply	-	9	3	2	54	Check the fuel level of diesel generator
Tapping hose	Oxygen hose cut	Fire	Ageing	-	8	3	3	72	Change hose periodically
Hot metal lifting by crane	Rope breakage	Hot Metal ladle down	Overloading	-	8	3	2	48	interlocks with alarm
Hot metal transfer by trolley	Mechanical Failure (Gearbox, Axial, Wheel)	Spillage of hot metal	Improper Maintenance	-	9	3	2	54	Regular inspection and Periodic maintenance
Gas cleaning filter bags	Filter bags failure	Improper gas cleaning	Excess Temperature	-	4	3	3	36	Regular inspection and Periodic maintenance
Lancing Hose	Tuyers puncture	Burns	Ageing	-	4	4	4	64	Check defects before use
Butterfly valve to regulate flow	Valve partially closed	CO Poisoning	Dust	-	9	2	3	54	Periodic Maintenance
Steam Injection	Pipeline cracks	Burns	Excess pressure	-	7	3	3	63	Display cautionary notice
Sponge Iron Plant									
Conveyor feed belt to DRI	Friction	Corrosion	Improper Maintenance	Belt Sway Switch	7	3	2	42	Lubricating the rotating parts regularly
Reducing Gas injection	Pipeline rupture	Process Failure in DRI Kiln	Over Pressure	Line Inspection	7	3	3	63	Regular inspection and Periodic maintenance
Cooler Discharged Gas	Pipeline rupture	Failure in After Burning Chamber	Excess Pressure	Line Inspection	6	3	3	54	Regular inspection and Periodic maintenance

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Mag Pulley	Mechanical Failure	Waste Conveying System Failure	Improper Monitoring	Inspection	5	3	2	30	Periodic Maintenance
Conveyor Belt to storage Bins	Friction	Waste Storage System Failure	Improper Maintenance	Belt Sway Switch	7	2	2	28	Lubricating the rotating parts regularly
Steel Melting Shop - Induction Furnaces & Electric Arc Furnaces									
Flow monitoring switch	Failure to operate	Rupture in Current Flow	Switch broken	Reliable Supplier	6	2	3	36	Regular Inspection
DC Choke	Failure to operate	Rise of current to dangerous level	Electric Failure	Reliable Supplier	7	3	2	42	Regular Inspection
DM Water circulating unit	Failure to circulate de ionized water	Excessive Heat generation in solid state power supply unit	Electric Failure	Inspection	4	3	3	36	Regular inspection and Periodic maintenance
Direction Control Valve	Failure to operate	furnace tilting control failure	Corrosion	Reliable Supplier	8	2	2	32	Periodic Maintenance
Furnace lamination packet	Electric/magnetic failure	Failure to provide a return path to the flux	Overheating of the structure	Inspection	7	3	2	42	Regular inspection and Periodic maintenance
Flow regulating valves in furnace	Failed to Operate	Excessive Temperature	Improper Maintenance	Indicator	6	3	3	54	Periodic Maintenance
Hot metal lifting by crane	Rope breakage	Hot Metal ladle down	Overloading	Safe working load are marked	7	3	3	63	interlocks with alarm
Hot metal transfer by trolley	Mechanical Failure (Gearbox, Axial, Wheel)	Spillage of hot metal	Improper Maintenance	ROW (3 m) marked, cover ladle, loading within Granted permissible limit	9	3	2	54	Regular inspection and Periodic maintenance
SMS - Continuous Casting Machine									
Ladle car	Friction	Fire	Improper Maintenance	Belt Sway Switch	8	2	3	48	Lubricating the rotating parts regularly
Stopper	Mechanical Failure	Fire & Explosion	Improper Maintenance	Indicator	7	2	3	42	Regular Inspection
Tundish	Failed to Operate	Spillage of Hot liquid metal	Mechanical Failure	Line inspection	7	2	2	28	Regular inspection and Periodic maintenance
Hot Rolling Mill									

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Conveyor rollers to feed	Friction	Fire	Improper Maintenance	Belt Sway Switch	8	2	2	32	Lubricating the rotating parts regularly
Water cooling pump	Pump failure	Explosion	No power supply	Redundant power supply	10	3	2	60	Check the fuel level of diesel generator
Dolochar & Coal Mix based CPP									
Boiler	Corrosion Effect	Cooling of tube increases temperature	Creep Failure	Line inspection	6	3	3	54	Regular inspection
Boiler	Tube Alignment & Setting	Deformation of vibration Arrestor	Vibration increases	Inspection	6	2	4	48	Periodic Maintenance
Turbine/Steam Generator	Temp. of Super Heater & Reheater	Failure of turbine blades	Changing the plant load	Line inspection	5	2	6	60	Periodic Maintenance
water Tank	Water Level of Drum	Excess Steam Pressure	Failure of Indicators	Monitor	6	3	3	54	Regular inspection

7.4.4.6 RESULT OF FEMA FOR PROCESS UNIT

The hot metal from MBF, Induction Furnaces & Electric Arc Furnaces is transported by crane / trolley which carry moderate risk priority number. This is well equipped with the interlocking facility with alarm in case of any overloading. Moreover, proper marking with ROW of 3 m is already in place along with all safe guards to ensure the absence of water throughout the hot metal transfer route.

7.4.5 RISK REDUCTION OPPORTUNITIES

The following opportunities will be considered as a potential means of reducing identified risks during the detailed design phase:

- Safety organization is of prime importance in the iron and steel industry, where safety depends so much on workers' reaction to potential hazards. The first responsibility for management is to provide the safest possible physical conditions, Accident-prevention committees, workers' safety delegates, safety incentives, competitions, suggestion schemes, slogans and warning notices can all play an important part in safety programmes.
- Provision for adequate water capacity to supply fire protection systems and critical process water;

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- Isolate people from load carrying/mechanical handling systems, vehicle traffic and storage and stacking locations;
- Installation of fit-for-purpose access ways and fall protection systems to facilitate safe access to fixed and mobile plant;
- Provision and integrity of process tanks, waste holding tanks and bunded areas as per relevant standards;
- Arrange display signs for material strictly prohibited inside any work premises like inflammable materials, firearms, weapons & ammunitions, etc.
- Developing 'Dos' & 'Don'ts' during various types of works like working at heights etc.
- Ensure that emergency control mechanisms like switch, valve and emergency lamp are covered with shield, water & shock resistance cover during rain etc. and peddle switch for bigger rotating machinery mixer etc. There should be no temporary cable joints and open air working switch yard at enriched level.
- In addition to the yard fire hydrant system, each individual shop would be provided with fire and smoke detection alarm system. Fire detection system would be interlocked with automated water sprinklers.
- Security of facility to prevent unauthorized access to plant, introduction of prohibited items, and control of onsite traffic; and
- Development of emergency response management systems commensurate.

Overall, an integrated approach combining good engineering and maintenance practices, safe job procedures, worker training and use of personal protective equipment (PPE) is required to control hazards.

7.5 DISASTER MANAGEMENT PLAN

A disaster is an unforeseen combination of circumstances that causes serious body injuries loss of life or extensive damage to the plant facilities or total.

Disaster is an undesirable occurrence of events of such magnitude and nature that adversely affect production, cause loss of human lives and property as well as damage to the environment. Industrial installations are vulnerable to various kinds of natural and manmade disasters. Examples of natural disasters are flood, cyclone, earthquake, lightning etc. and manmade disasters are like major fire, explosion, sudden heavy leakage of toxic/poisonous gases, civil war, nuclear attacks, terrorist activities etc. It is impossible to forecast the time and nature of disaster which might strike an undertaking. However, an effective disaster management plan helps to minimize the losses in terms of human lives, plant assets and environmental damage and then resumes working condition as soon as possible. Risk analysis forms an integral part of disaster management plan and any realistic disaster management plan can only be made after proper risk analysis study of the activities and the facilities provided in the installation. Correct assessment and evaluation of the potential hazards, advance meticulous planning for prevention and control, training of personnel, mock drills and liaison with outside services available can minimize losses to the plant assets, rapidly contain the damage effects and effectively rehabilitate the damage areas.

Anyone or more of the following uncontrollable factors may cause disaster:

1. Reduction or failure of cooling water
2. Failure of Power
3. Rupture or damage of the line, vessel or tank
4. Excessive leakage of inflammable or corrosive or toxic material
5. Cyclone
6. Earthquake
7. Fire or explosion
8. Sabotage
9. Riot,
10. Air Raid

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The Disaster Management Plan of the company is divided into two parts:

(i) **Onsite Emergency Plan**

In this plan, the company officers are given pre-designated responsibilities for dealing with the emergency.

(ii) **Offsite Emergency Plan**

In this, different Govt. agencies will be conformed about the emergency for necessary help from them.

7.5.1 **OBJECTIVE OF DISASTER MANAGEMENT PLAN**

The objective of Disaster Management Plan is to ensure safety of life, protection of environment, protection of installation and restoration of production.

For effective implementation of the disaster management plan, it will be widely circulated and personnel training given through rehearsals/drills. The disaster management plan would reflect the probable, consequential severities of the undesired event due to deteriorating conditions.

To tackle the consequences of a major emergency inside the factory or immediate vicinity of the factory, a disaster management plan has to be formulated and this planned emergency document is called “Disaster Management Plan”.

The objective of the industrial disaster management plan is to make use of the combined resources of the plant and the outside services to achieve the following:

- Proper training should be provided to ensure safe operation of the crane for hot metal transfer. There should be proper communication and use of standard hand signals between crane drivers and slingers to prevent injuries from unexpected crane movement / spillage of hot metal
- Ensuring proper safe guard by providing rail guards with inter locks in all those areas where hot metal transfer takes place.
- Inspection and maintenance programs for crane parts, ropes, lifting tackle, hooks to prevent dropped loads.

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- Safe means of access to cranes to avoid falls and accidents on crane transverse ways.
- Regular maintenance shall be ensured for Mechanical parts of trolleys like Gearbox, Axial & Wheels to avoid any spillage of hot metal during transportation.
- Proper training should be imparted to the workers, which should include information about hazards, safe methods of work, avoidance of risks and the wearing of PPE.
- Furnace operators should be protected by enclosing the source of noise by providing sound proof shelters. Reducing exposure time may also prove effective. Hearing protectors (earmuffs or earplugs) are often required in high-noise areas.
- All dangerous parts of machinery and equipment, including lifts, conveyors, long travel shafts and gearing on overhead cranes, should be securely guarded.
- Proper ventilation should be provided throughout the plant wherever substantial quantity of dust, fumes and gas are generated, together with the highest standards of cleanliness and housekeeping.
- Gas equipment must be regularly inspected to prevent any gas leakage. Whenever any work is to be done in an environment likely to contain gas, carbon monoxide gas detectors should be used to ensure safety. When work in a dangerous area is unavoidable, self-contained or supplied-air respirators should be worn. Breathing-air cylinders should always be kept in readiness.
- Heat protection should be provided between workers and radiant heat sources, such as furnaces or hot metal.

7.5.2 ON-SITE EMERGENCY PLAN

- A)** The disaster control procedure lays down the efforts to be made to prevent fatal accidents, physical harm or injury to personnel and damage to equipment facilities materials. It requires coordinated efforts of all employees to control and eliminate a disastrous situation.
- B)** All efforts to control a disaster will be coordinated among the various co-ordinators and all actions, taken will be as directed by the chief co-ordinator. The co-ordinating members will be

responsible to keep him posted on the development and course of action will be followed by them [refer **Annexure-7-II**].

7.5.3 FACILITIES TO BE AVAILABLE WITHIN THE FACTORY

a) Fire Fighting Facility

The entire factory will be protected with fire extinguishing system from outside and inside the shop floor.

b) Material Handling

Heavy duty cranes including mobile cranes, fork lifts, trucks, trolleys will be used in the plant. The same could be used at time of emergency for handling the material.

c) Personnel Protective Equipment

Safety shoe, safety helmets, safety goggles, asbestos hand gloves, rubber hand gloves, acid proof aprons, earplugs, aprons, leg guards etc. will be made available in the Central store of the plant. At the time of emergency, the same can be made easily available by safety coordinator.

d) Medical Facility

The Plant will have the required emergency medical facilities and health check-up for the workers will be done regularly by the visiting Doctors. In case of major accident, persons will be referred to nearest Hospital/Primary Health Centre.

7.5.4 OBJECTIVES

The objective of the On-site Emergency Plan will be to make maximum use of both the internal as well as the external resources:

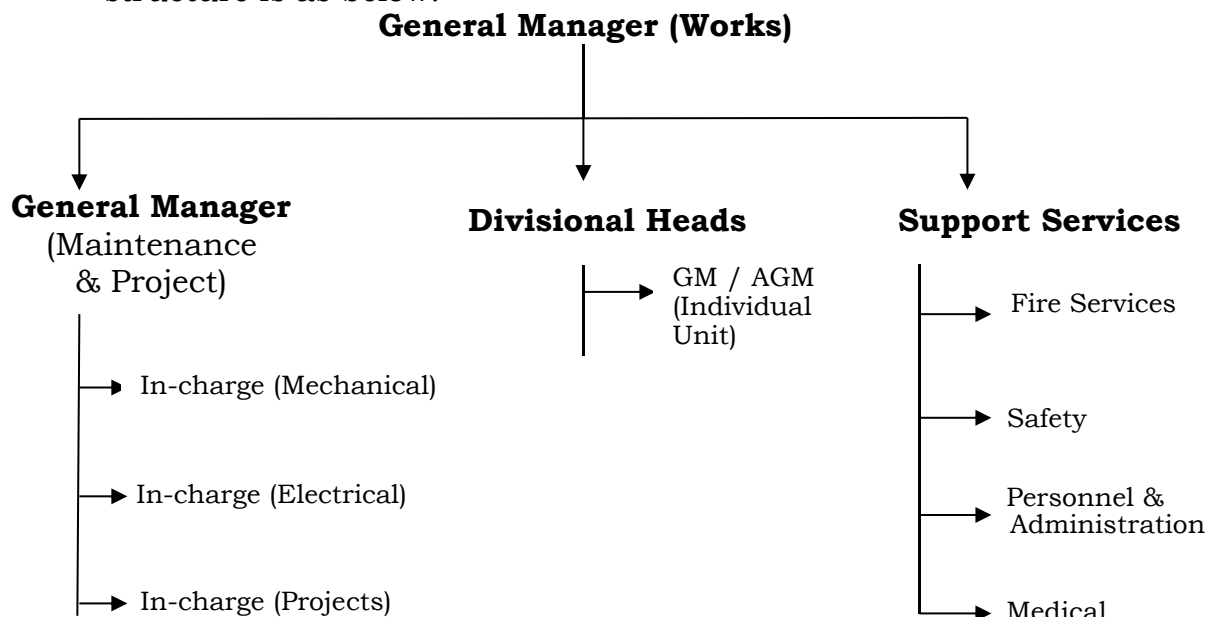
- For rescue and treatment of casualties and safeguard personnel in the premises.
- To minimize damage to property and environment.
- To initially contain and ultimately bring the incident under control.
- To ensure safe rehabilitation of affected areas.
- To provide authoritative information to the news media.
- To preserve relevant records and equipment for the subsequent inquiry into the cause and circumstances of emergency.

7.5.5 KEY PERSONNEL AND RESPONSIBILITIES

The actions necessary in an emergency will clearly depend upon the surrounding circumstances. Nevertheless, it is imperative that the required actions will be initiated and directed by nominated people, each having specified responsibilities as part of coordinated plan. Such nominated personnel will be known as Key Personnel.

7.5.6 ORGANIZATION

The Central Disaster Management Cell (DMC) will be set up under the direct charge of General Manager (Works). Organizational structure is as below:

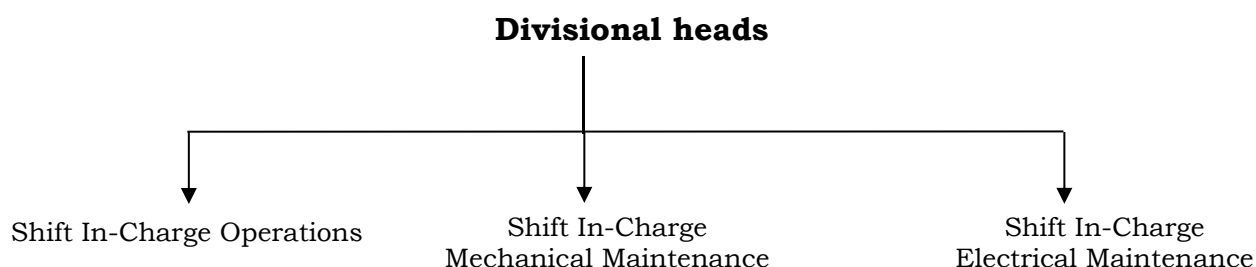


General Manager (Works) will be empowered to declare emergency and he would be in charge of all operations in such situations. He will be supported by GM (Maintenance & Projects), Divisional Heads of respective all Plants, Security and Fire Fighting, Administration, Medical Officer, In-charge Safety and In-charge Environment in handling such a situation.

Disaster Control Cell will operate from the Administrative block during emergency.

There will be shop level Disaster management cell in each division. Divisional heads will be nominated as controllers for their

respective divisions. They will support central team as required. Organizational structure is as below:



7.5.7 OFF SITE EMERGENCY PLAN

Type of emergency facilities/actions required from outside bodies:

- a) Fire-fighting facilities required: Factory will have its own fire-fighting facilities but during emergency, fire brigade can also be called.
- b) During emergency help of Police will be required for evacuation of the people. Moreover, traffic control, security arrangements etc. shall be made available.
- c) Medical help required: seriously injured personnel may be referred to the Hospital/Primary Health Centre depending upon the gravity and type of injuries.

List of Key persons of Off- Site Emergency Plan has been given in **Annexure – 7-III**.

7.6 EDUCATION OF PUBLIC

In the emergency People living within the influence zone will be educated in a suitable manner. This can be achieved only through the Local and District Authorities. However, necessary information can be extended to the Authorities.

7.7 REHABILITATION AND RESETTLEMENT (R&R)

The proposed project will be installed on the available land within the existing plant area as well as on the additional land adjacent to its existing plant premises comprising of total 30.25 Hectares (74.74 Acres) land.

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Out of the total land of 30.25 Hectares (74.74 Acres), 20.82 Hectares (51.44 acres) private land are already acquired. The remaining 9.43 Hectares (23.30 acres) is in the process of Acquisition.

The whole projected land for the proposed expansion project is generally flat and does not come under the flood hazard zone. There is no human settlement in the existing as well as proposed land for the proposed expansion project site. So, the R&R plan will not be applicable for this Project.

ANNEXURE-7-I

CHEMICAL DATA SHEET

The factory will have only fire hazardous chemicals as shown below:

Fire Hazardous Chemicals	Handling	Storage Facility	Nature of Hazardous
LDO	Storage Tanks	Drums/Tank segregated	Fire hazard

Likely occurrence of major accidents from:

- a)** Storage – Likely occurrence of major accidents could only be a fire and explosion.
- b)** Process – From Processes also likely occurrence of major accident could be fire. Since processes does not involve any toxic chemicals and hence no chance of leakage of toxic gases.
- c)** Leakage / Splashing of liquid metal.

Physical range of consequences propagating:

- a)** From storage – Entire process plant
- b)** From process – Localize to affected area

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ANNEXURE – 7-II

List of Key persons for on Site Emergency Plan

Sl. No.	Emergency Co-ordinator
1	Executive Director
2	General Manager (Works)
3	General Manager (Maintenance & Projects)
4	General Manager/ Asstt. General Manager (Individual Unit)

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ANNEXURE – 7-III

List of Key persons for Off-Site Emergency Plan

01	Collector of District
02	Asst. Director I & II
03	Fire Office
04	Controller of Explosive
05	District Informatics Officer
06	Superintendent of Police
07	District Health Officer
08	Assistant Labour Commissioner
09	SDO

CHAPTER-8.0

PROJECT BENEFITS

Implementation of the proposed expansion project of M/s AIC Iron Industries Private Limited, having its project cost around Rs. 1652 Crores located at village: Benipur, P.O.: Saltor, P.S.: Neturia, Dist: Purulia in West Bengal. The proposed expansion project will be a boon to the region and will give various benefits to society of the region.

BENEFITS FROM THE PROPOSED PROJECT:

1) Improvement of living conditions to the local people:

Such project is expected to improve living conditions by providing better employment opportunities and thereby, result in further reduction of population below poverty line, which is one of the prime policy objectives of the Government.

2) Improvement of the Society:

It is expected that by creation of good employment potential and industrialization of this area, poor/weaker section of the society will enjoy higher earning power and quality of life.

3) Infrastructure Development:

The project is expected accelerate the infrastructure development in and around the area, such as rail, road, transports and communication facilities.

4) Improvement of Hospitality Services:

Through the proposed project it is expected to improve hospitality services such as hotels/lodgings houses, restaurants, fast food joints, transport services, couriers, travel, shopping, amusement park, communication facilities, hospitals/nursing homes as well as education facilities such as schools, colleges and other professional institutes/training centers/coaching centers in the region.

5) Employment Opportunities:

The employment opportunities, both direct and indirect, that will arise from the proposed project are described below:

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Direct employment : Direct employment of 500-750 persons on daily average basis during the construction period. Around 1600 persons will get direct employment in the project during the operation stage. Preference shall be given to local people depending upon their skill and qualification.

Indirect employment : The project will create opportunities for indirect employment to persons who shall be employed for the greenery development work in and around the plant site.

The project is expected to create opportunities for indirect employment to about 150 persons (as drivers, conductors and attendants of new trucks, passenger carrying vehicles, technicians in workshops and garages besides the plumbers, electricians and masons). The project will create opportunities for indirect employment due to increase in trade opportunities like stockiest/ retailers of building materials, groceries, provision shops, medical stores, garment shops, furniture shops, etc.

Trading of equipment and materials such as plates, pipe fittings, valves, pumps, compressors, electrical machinery and construction materials provide employment and income to a large number of people.

The recommendations given by CPCB in the form of Corporate Responsibility for Environmental Protection for steel industry shall be 100% complied. This will result in lowest possible emissions, water conservation and reuse of treated waste water, solid waste utilization and resultant low cost of production.

The point-wise compliance to the issues, raised during this meeting along with the action plan and budgetary provision will be presented in Final EIA Report.

CHAPTER-9.0

ENVIRONMENTAL COST BENEFIT ANALYSIS

M/s AIC Iron Industries Private Limited has decided to expand its activity by installation of 1X0.5 MTPA capacity Sinter Plant, 1X500 M³ capacity MBF, 3x650 TPD DRI Kilns (6,43,500 TPA Sponge Iron), 6x25 T Induction Furnaces, 1x25 T Electric Arc Furnaces along with 1x15 TPH Slag Crusher unit, Enhancement (through optimization in operation) the production capacity of 4x15 T + 2X10 T Induction Furnaces (as per EC 2010 & 2023), 3x12 MVA capacity Submerged Arc Furnaces, 1x0.3 MTPA capacity Rolling Mill, Lime Plant (250 TPD), Oxygen Plant (225 TPD), 1x0.5 MTPA capacity Ductile Iron Pipe (DIP) Plant, 60,000 TPA capacity Galvanising Unit along with 4x4000 Nm³/Hr capacity Producer Gas Plant and 100 MW capacity Captive Power Plant (70 MW WHRB + 30 MW AFBC/CFBC) within the existing plant premises at Village - Benipur, P.O.: Saltor, Dist. Purulia in West Bengal. The proposed project will be installed on the available land within the existing plant area as well as on the additional land adjacent to its existing plant premises comprising of total 30.25 Hectares (74.74 Acres) land. Implementation of such proposed expansion project having its project cost around Rs. 1652 Crores will be a boon to the region and will give various benefits to society of the region. With proposed expansion this steel plant would undoubtedly have great impact on socio-economic development in the project surrounding area.

It is noteworthy that no forest land will be required for the expansion purpose. Therefore, there will no environmental loss due to conversion of forest land to non-forest (industrial) land.

Therefore, it is very clear that from the environmental point of view loss is very minimal due to the proposed project expansion.

On the other hand, the project proposal would not only generate a huge amount of govt. revenue but also a considerable number of direct/indirect employment opportunities followed by peripheral development.

Therefore, Environmental Cost Benefit Analysis for the proposed expansion project shall consider all these parameters.

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History of Cost-Benefit Analysis (CBA)

It was originated in the area of research called welfare economics. It helps to answer questions about the benefit of one outcome over another, from a societal standpoint. Welfare economics uses criterion from the Utilitarian philosophy of the eighteenth century. These researchers tried to "compare outcomes on the basis of what gives the greatest benefit to the greatest number of people. Benefit here means utility: thus, welfare economics looks at ways of comparing outcomes in terms of their contribution to the utility of the population as a whole". The value of environmental costs and benefits are most clearly understood when represented in monetary units, and then balanced against one another.

Benefits are defined as increases in human well-being (utility) and costs are defined as reductions in human well being. For a project or policy to qualify on cost-benefit grounds, its social benefits must exceed its social costs.

Environmental cost-benefit analysis (CBA) is the application of CBA to projects or policies that have the deliberate aim of environmental improvement or actions that somehow affect the natural environment as an indirect consequence.

Methodology

Different internationally famous research organisations have come with useful publications dealing with the problem of measuring social costs and social benefits. It may be noted, in this context, that the actual cost or revenues from the goods and/or services to the organization do not necessarily reflect the monetary measurement of the cost and or benefit to the society. This is because these figures are grossly distorted on account of restriction and controls imposed by the government. Hence a different yardstick has to be used for evaluating a particular in terms of cost and sacrifice on the part of the society. Such payments are easily valued at opportunity cost or shadow prices to judge their real impact in terms of cost to society for the purpose of social cost benefit evaluation.

One of the most acceptable approaches is a five-stage methodology:

1. Calculation of financial profitability measured at market prices.
2. Obtaining the net benefit of the project measured in terms of economic prices.

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3. Adjustment for the impact of the project on savings and investment.
4. Adjustment for the impact of the project on income distribution.
5. Adjustment for the impact of the project on merit goods and demerit goods

It is imperative to mention that Social Cost Benefit Analysis is a model based on the theory of welfare economics, according to which the welfare of a society depends on the aggregate individual utility levels of all members of that society.

The objective of cost-benefit analysis is, in its widest sense, to secure and achieve the value of money in economic life by simply evaluating the costs and benefits of alternative economic choices and selecting an alternative which offers the largest net benefit.

Therefore, it can be said that the main focus of Social Cost Benefit Analysis is to determine:

1. Economic benefits of the project in terms of a price (shadow price) that reflect social value;
2. The impact of the project on the level of savings and investments in the society;
3. The benefit of the project in the society;
4. The Cost of the project in the society.

Net Present Value

Net Present Value (NPV) equals the sum of the benefits in present value minus the sum of the costs in present value.

EVALUATION OF COST OF PRESENT VALUES		
S.N.	Parameters	Value
1.	Loss of value of timber, fuel wood and minor forest produce on an annual basis, including loss of man hours per annum of people who derived livelihood & wages from the harvest of these commodities	NIL Since it is a expansion, hence no loss of man hours as no one depends for livelihood on this land.
2.	Loss of animal husbandry productivity, including loss of fodder	NIL There is no loss of animal husbandry productivity and loss of fodder.
3.	Cost of human resettlement	NIL There is no loss involved on account of human resettlement.
4.	Loss of public facilities and administrative infrastructure (Roads, buildings, schools, dispensaries, electric lines, railway etc) on forest land, or which would require forest land if these facilities were diverted due to the project	NIL No administrative infrastructures such as roads, buildings, schools, dispensaries, electric line, railway, etc are/shall be affected due to existing or from proposed expansion project. There will be no loss involved on this account.
5.	Environmental losses : (Soil erosion, effect on hydrological cycle, wildlife habitat, microclimate upsetting of ecological balance).	NIL Impact assessment has been done in all aspects and incorporated in draft EIA report
6.	Suffering of oustees	NIL No land oustees
7.	Capital Investment	Rs. 1652 Crore
	TOTAL	Rs. 1652 Crores (A)

EVALUATION OF BENEFITS OF PRESENT VALUES		
S.N.	Parameters	Value
1.	Total Profit realization expected (in First 10 years)	Rs. 5318 Crores
2.	Benefits of economy (govt. revenue/cess etc.) in 10 years	Rs. 7324 Crores
3.	Employment potential	Construction Phase: No. Of employment - 500 for 3 years. (Approx. 5,25,000 man days in 3 years) Av. value @ Rs. 600 per man day = <u>Rs. 31 Crores (approx.)</u> Operation Phase: No. of direct employment – 1600 (Approx. 39,20,000 man days in first 7 years) Av. value @ Rs. 600 per man day = <u>Rs. 235 Crores (approx.)</u> Another <u>Rs. 500 Crores (approx.)</u> should be considered towards indirect employment. Hence Benefits due to employment (direct & indirect) = Rs. 766 Crores.
4.	Estimated Cost towards EMP	Rs. 100 crores (capital cost) Rs. 10 Crores per annum (recurring) So, recurring cost in first 7 years (cumulative) Rs. 70 crores. Total benefits (capital investment + recurring) – Rs. 170 Crores.
5.	70 MW Power generation through WHRB utilising waste heat from flue gases	3648 Million unit power generation in 7 years. Considering Rs. 5 per unit electricity, Rs. 1824 Crores will be saved through power

		generation in non-conventional energy source.
6.	Green Belt Development	Rs. 0.53 crores
7.	CSR	-
	TOTAL	Rs. 15,402.53 Crores, Say Rs. 15,403 Crores (B)

Therefore, Net Present Value (NPV) equals to **B** minus (-) **A** = Rs. 15,403 Crores – Rs. 1652 Crores = Rs. 13,751 Crores

Therefore, Benefit Cost ratio = Rs. 15,403Crores / Rs. 1652 Crores = 9.32

Internal Rate of Return (IRR):

The internal rate of return is the discount rate for which the NPV is zero. This is the rate that your money would have to earn in another investment for you to be indifferent to the investment. The term “IRR” is often used interchangeably with the term, “economic rate of return,” or “ERR.”

A ten-year time horizon has been considered here. Total capital outlay i.e. the project cost Rs.1652 crores. Assuming the construction time, Cash flow of the initial 3 years are negative. Project operation phase has been assumed from fourth year, therefore, Cash flow assumed positive fourth year onwards.

Year	Cash Flow (Rs. Crore)
First year	(-)ve 991
Second year	(-)ve 330
Third year	(-)ve 330
Fourth year	(+)ve 610
Fifth year	(+)ve 784
Sixth Year	(+)ve 784
Seventh Year	(+)ve 784
Eight Year	(+)ve 784
Ninth Year	(+)ve 784
Tenth Year	(+)ve 784

By using the Internal Rate of Return (IRR) function in Microsoft Excel, the return value of IRR is 26 %

Cost Effectiveness Analysis:

Cost Effectiveness Analysis (CEA) is an alternative form of CBA. It assesses the net cost of a project or service relative to the outcomes (benefits) generated. CEA is used where the need for a project has already been established, but uncertainty remains over the best method for achieving it.

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1. It does not require all costs and benefits to be put into monetary terms.
2. It acknowledges that a measure may not represent all of the benefit that is accrued.
3. It may be analysing intermediate goods (outcomes may not be clear).

As such it does not constrain the researcher into having to apply monetary values to certain variables. For example, the development of a new hospital would likely result in a number of saved lives in an area, but whereas standard forms of CBA would require a monetary value be placed on the value of a life saved, CEA does not require this.

CEA considers alternatives in reference to the ratio between the costs associated with each alternative and a single quantified, but not monetary, effectiveness measure. This represents a complication of CEA as costs are represented by monetary values, while effectiveness may be measured in terms of saved lives, time savings or other similar quantifiable measures.

For this reason, in CEA a ratio is calculated. Two forms of ratio can be expressed:

1. *Cost-Effectiveness Ratio*: dividing costs of an alternative by the measure of effectiveness.
2. *Effectiveness-Cost Ratio*: dividing effectiveness measured by costs of alternative.

In case of the expansion proposal of M/s AIC Iron Industries Pvt. Ltd., apart from the project cost, the other costs are negligible, as because:

- There will be no loss of value of timber, fuelwood and minor forest produce on an annual basis, including loss of manhours per annum of people who derived livelihood & wages from the harvest of these commodities
- There will be no loss of animal husbandry productivity, including loss of fodder.
- Cost of human resettlement is zero.
- No Loss of public facilities and administrative infrastructure (Roads, buildings, schools, dispensaries, electric lines, railway etc) on forest land, or which would require forest land if these facilities were diverted due to the project
- No Environmental losses due to soil erosion, effect on hydrological cycle, wildlife habitat, microclimate upsetting of ecological balance.

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- There will be no suffering of oustees.

On the other hand, the project proposal would be effective in number of ways by generating a considerable number of direct/indirect employment opportunities, govt. revenues. On account of CSR of the company, peripheral development will also take place.

Therefore it can be concluded that the cost-effectiveness ratio in terms of the proposed expansion will certainly be favourable.

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CHAPTER-10.0

ENVIRONMENTAL

MANAGEMENT PLAN

10.1 BASIC CONTENTS

Environmental Management Plan is the key to ensure a safe and clean environment. A plant may have taken proper pollution control measures but without a management plan to assure its proper function, the desired results may not be obtained.

Various pollutants' generation, their control & disposal for the proposed expansion projects have been discussed in **Chapter-2**. In this chapter, various mitigatory measures, to be taken by the company to ensure the overall Environmental Management System of the plant are discussed.

10.2 GREEN BELT DEVELOPMENT PLAN

The potential value of vegetation in controlling air pollution has been well recognized. Trees can filter particulates and are effective pollutant sink. Vegetation also reduces noise level and regulates the oxygen balance in the area by consuming released carbon dioxide. In order to improve the aesthetic look of the area and enhance the land use as well as to compensate for any loss in ecology during construction, adequate plantation programmes all around the project site have been planned and will be adopted. Development of green belt will include plantation of trees along boundary of the factory, roads, raw material yard and other available spaces. The plant species will be selected on the basis of their growth and morphological characteristics (height, crown and ornamental values) and factors like availability of local species, resistance to pollutants, location of sources, plant layout, meteorological conditions, water availability etc.

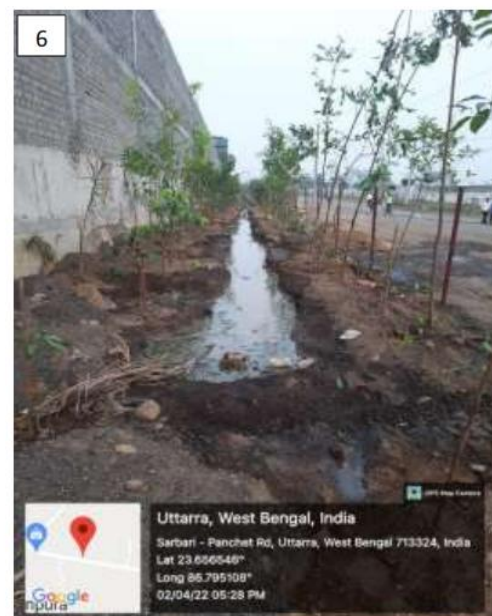
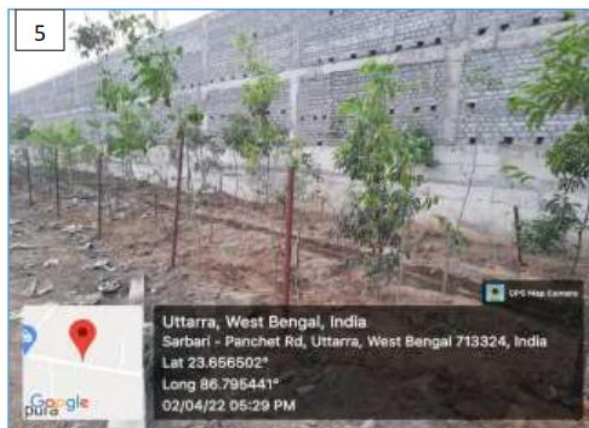
The proposed expansion project of **M/s AIC Iron Industries Private Limited** will be installed on the available land within the existing plant area as well as on the additional land adjacent to its existing plant premises comprising of total 30.25 Hectares (74.74 Acres) land. 33% of the total land area i.e. 9.98 Hectares (24.66 acres) shall be earmarked for greenbelt development out of which 3.30 hectares (8.16 acres) of land is already developed as greenbelt where around 8250 number of

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trees have been planted till date. The balance 16700 trees will be planted in the project site (@2500 trees/Hectares)



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Species of tree to be used for plantation should be such that they are fast growing, strong, and pollutant resistant. The plantation should be a mix of different varieties. A three tier plantation scheme comprising of:

- Outer ring of tall, thick canopy trees.
- Middle ring of less taller trees.
- Inner core layer of tolerant species.

The species selected for such green belt development in the plant area is presented in **Table-10.1**.

TABLE-10.1		
LIST OF SELECTED TREES FOR PLANTATION		
SL. NO.	TREE SPECIES	COMMON NAME
1	<i>Pongamia Pinnate</i>	Karanj
2	<i>Acacia Catechu</i>	Katha
3	<i>Mimusops Elengi</i>	Bakul
4	<i>Butea Monosperma</i>	Palash
5	<i>Casaea Fistula</i>	Amaltas
6	<i>Dalbergia Sissoo</i>	Sissoo
7	<i>Neolamarckia Cadamba</i>	Kadam
8	<i>Ficus Bengalensis</i>	Banyan
9	<i>Ficus Religiosa</i>	Peepal
10	<i>Madhuca Latifolia</i>	Mahua
11	<i>Purging Cassia</i>	Sonajhuri
12	<i>Moringa Oleifera</i>	Drumstick
13	<i>Terminalia Arjuna</i>	Arjun
14	<i>Azadirachta Indica</i>	Neem
15	<i>Tectona Grandis</i>	Teak
16	<i>Mangifera Indica</i>	Mango
17	<i>Albizia Lebeck</i>	Siris
18	<i>Artocarpus Heterophyllum</i>	Jackfruit
19	<i>Cocos Nucifera</i>	Coconut
20	<i>Polyalthia Longifolia</i>	Ashoka
21	<i>Dendrocalamus Strictus</i>	Bamboo

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Criteria for Selection of Species:

- Large crown volume
- Rapid growth
- Capacity to endure water stress and climatic conditions
- Difference in height and growth habits
- Mixed plantation will be carried out keeping optimum spacing between saplings
- Native Species will be preferred for plantation in consultation with local Horticulturists and Forest Officials.

Phase Wise Green Belt Development Plan

Green belt will be developed in a phase wise manner right from the construction phase of the project. In the first phase of construction with the start of the construction activity, the plant boundary, around the proposed temporary solid waste storage areas and the major roads will be planted. In the second phase of the construction, the office building area will be planted. And, in the third phase of the construction, when all the construction activity will be complete, plantation will be taken up in the plant area, in stretches of the open land and along other roads.

The trees may be watered using the treated effluent. They will be manured using sludge from the sewage treatment plant (STP). In addition, kitchen waste from the plant canteen can be used as manure either after composting or by directly putting the manure at the base of the plants. The data on area of green cover, survival rate etc. will be compiled for periodic review. However, following plan shall be made for green belt development:

- Annual plans for tree plantation with specific number of trees to be planted shall be made. The fulfillment of the plan shall be monitored by the Horticulture department every six months.
- A plan for post plantation care will be reviewed in the monthly meetings. Any abnormal death rate of planted trees shall be investigated.
- Watering of the plants, manuring, weeding, hoeing will be carried out for minimum 3 years.

10.3 CORPORATE ENVIRONMENT POLICY

The Company has set goals and objectives laid by its board of Directors. Corporate Environment Policy (CEP) prescribes for standard operating process / procedures to bring into focus any infringement / deviation / violation of the environmental or forest norms / conditions. It also constitutes the hierarchical system or Administrative order of the

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company to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions. The company has system of reporting of non-compliances / violations of environmental norms of the Board of Directors of the company and / or shareholders or stakeholders at large. All the above statements are mentioned in CEP and company has its working based on its concern towards Environment.

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Corporate Environment Policy

- i. **Does the company have a well laid down Environment Policy approved by its Board of Directors? If so, it may be detailed in the EIA report.**

*Yes. The Company has a well laid down Environment Policy approved by the Board of Directors and the same **is enclosed as Addendum 10.1.***

- ii. **Does the Environment Policy prescribe for standard operating process/ procedures to bring into focus any infringement/ deviation/ violation of the environmental or forest norms/ conditions? If so, it may be detailed in the EIA.**

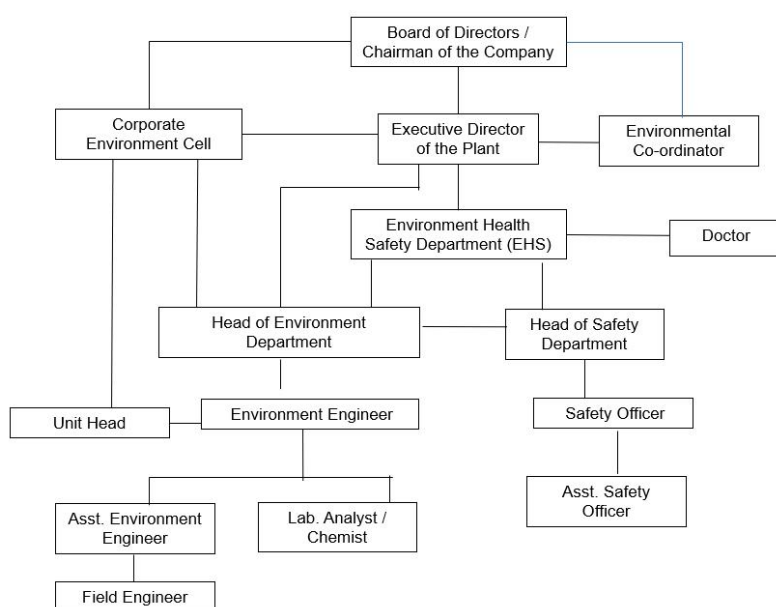
*Yes. Environment Policy clearly mentions that, in case of emergency (non-compliance/ infringement / deviation / violation / major accident), Head of Environment Department will do immediate reporting to the Chairman cum Managing Director of the Company. The detailed policy **is enclosed as Addendum 10.2***

- iii. **What is the hierarchical system or Administrative order of the company to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions? Details of this system may be given.**

*The hierarchical system or Administrative Order of the company to deal with environmental issues and for ensuring compliance with the environmental clearance conditions is furnished **as Addendum 10.2.***

- iv. **Does the company have system of reporting of non-compliances/ violations of environmental norms to the Board of Directors of the company and/or shareholders or stakeholders at large? This reporting mechanism shall be detailed in the EIA report.**

Yes. To have proper checks and balances, the company has a well laid down system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the company and the same is represented below.



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Addendum - 10.1

Environment Policy approved by the Board of Directors

AIC Iron Industries Pvt. Ltd.

25, GANESH CHANDRA AVENUE, 4TH FLOOR, KOLKATA - 700 013
 Tel. No. : +91 - 33 - 2221 7535 / 36 • Fax No. : +91 - 33 - 2211 4567
 E-mail : aic_iron@aicsteel.in • CIN : U27109WB2003PTC097420



CORPORATE ENVIRONMENT POLICY

M/s. AIC Iron Industries Pvt. Ltd., is a Private Limited Company which was incorporated on 28th February, 2003, having its registered office at 25, Ganesh Chandra Avenue, Kolkata-700 025, West Bengal.

The company recognizes its joint responsibility with the Government and the Public to protect environment and is committed to regulate all its activities so as to follow best practicable means for minimizing adverse environmental impact arising out of its operations.

This Policy document reflects the continuing commitment of the Board for sound Environment Management of its operations. The Policy is applicable to all company operations covering manufacturing, sales and distribution and other offices. This document defines the aims and scope of the Policy as well as responsibilities for the achievement of the objectives laid down.

THE VISION

Our business approach not only seeks to minimize our environmental footprint but also contribute in enhancing the environmental quality in and around our work area.

ENVIRONMENT POLICY

The Company is committed to meeting the needs of customers in an environmentally sound manner, through continuous improvement in environmental performance in all our activities. Management at all levels, jointly with employees, is responsible and will be held accountable for company's environmental performance.

Accordingly, the Company aims to:

- ❖ Continuously assess our environmental impacts and measure and improve our environmental performance by adopting best practices for prevention and control of pollution.
- ❖ Ensure safety of its products and operations for the environment by using standards of environmental safety, which are scientifically sustainable and commonly acceptable.
- ❖ Develop and maintain environmental management system across the company to meet the company standards as well as statutory requirements for environment. Verify compliance with these standards through regular auditing.
- ❖ Make continuous efforts to reduce water intensity and fresh water usage by increased use of harvested and recycled water in our operation.

for M/s AIC Iron Industries Pvt. Ltd.,

Dinesh Adukia
(Director)

Works : Village Benipur, Post Saltore - 723121, Dist. Purulia (W.B.)

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AIC Iron Industries Pvt. Ltd.

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- ❖ Reduce waste, conserve energy and explore opportunities for reuse and recycle.
- ❖ Conduct all our operations in an environmentally responsible manner that is well compatible with the statutory environment compliances and applicable standards.
- ❖ Involve all employees in the implementation of this Policy and provide proper training.
- ❖ Work in partnership with external bodies and Government agencies to promote environmental care, increase understanding of environmental issues and disseminate good practices.

CORPORATE RESPONSIBILITIES

The Directors/ Chairman of the Company is responsible for the Compliance of the Policy. The Directors/ Chairman shall constitute a Cell called as Corporate Environment Cell (CEC). The CEC is committed to conduct the company operations in an environmentally sound manner. The CEC will:

- ❖ Set standards and establish environmental improvement objectives and targets for the Company as a whole and ensure these are included in the annual operating plans.
- ❖ Formally review environment performance of the company and report environmental performance to the Board of Directors/ Chairman of the company directly once every quarter.
- ❖ In case of emergency (non-compliance/deviation/violation/major accident) immediate reporting to be done by the respective unit/departmental Heads to the Directors/ Chairman of the Company.
- ❖ Review environment performance on monthly basis and recognize exemplary performance.

The overall responsibilities for environment management at plant level rest with head of Environment Department. The Head of the Environment Department will:

- ✓ Ensure implementation of Policy on environment at plant level and review, report environment performance of the plant to the Board of Directors / Chairmen of the Company through CEC Cell once every quarter.
- ✓ In case of emergency (non-compliance / deviation / violation / major accident) Head of Environment Department will do immediate reporting to the Directors, Chairman of the Company.

The Corporate Environment Cell in co-ordination with Head of Environment Department will:

- ❖ Ensure implementation of Policy on environment and compliance with the Company's environmental standards and standards stipulated as per law.
- ❖ Prevention of incidents or accidents that might result from abnormal operating conditions.

for M/s AIC Iron Industries Pvt. Ltd.,

Dinesh Adukia
(Director)

Works : Village Benipur, Post Saltore - 723121, Dist. Purulia (W.B.)

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AIC Iron Industries Pvt. Ltd.

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- ❖ Reduction of adverse effects that result from normal operating conditions.
- ❖ Establish appropriate management system for environment management and ensure regular auditing to verify compliance.
- ❖ Establish systems for appropriate training in implementation of Environment Management System at work.
- ❖ Ensure periodic 3rd party environment audit through certification bodies to check efficacy of the Environment Management Systems.
- ❖ Participate, wherever possible, with appropriate industry and Government bodies advising on environmental legislation and interact with national and local authorities concerned with protection of environment.

INDIVIDUAL UNITS RESPONSIBILITIES

The overall responsibility for environment management lies with the Chairman of the Company. The Heads of the respective units is responsible for the implementation of Policy on environment at unit level and report to Head of Environment Department or CEC Cell as the case may be on monthly basis. Concerned line managers/heads of departments are responsible for environmental performance at department levels.

In order to full fill the requirements of the Policy at each site, the Unit Head will:

- ❖ Designate a unit environment co-ordinator who will be responsible for coordinating environmental activities at unit, collecting environmental data and providing expert advice and reporting environmental performance to the Unit Head on day to day or weekly basis as the case may be.
- ❖ Agree with the co-ordinator responsible for the unit specific environmental improvement objectives and targets for the unit and ensure that these are incorporated in the annual objectives of the concerned managers and officers and are reviewed periodically.
- ❖ Ensure that the unit complies with the Company environmental standards and the relevant national and state regulations with respect to environment.

for M/s AIC Iron Industries Pvt. Ltd.,

Dinesh Adukia
(Director)

Works : Village Benipur, Post Saltore - 723121, Dist. Purulia (W.B.)

M/s AIC Iron Industries Pvt. Ltd.	Environmental Impact Assessment for Proposed expansion of existing Steel Plant at Village: Benipur, P.O.: Saltor, P.S.: Neturia, Dist: Purulia, West Bengal	C10 - 11
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AIC Iron Industries Pvt. Ltd.

25, GANESH CHANDRA AVENUE, 4TH FLOOR, KOLKATA - 700 013
Tel. No. : +91 - 33 - 2221 7535 / 36 • Fax No. : +91 - 33 - 2211 4567
E-mail : aic_iron@aicsteel.in • CIN : U27109WB2003PTC097420



- ❖ Ensure that all new operations are subjected to a systematic and formal analysis to assess environmental impact Findings of such exercises should be implemented prior to commencement of the activity.
- ❖ Regularly review environment performance of the unit against set objectives and targets and strive for continual improvement.

The Unit Head, through the Designate unit environment coordinator will:

- ❖ Ensure periodic audits to verify compliance with environment management systems.
- ❖ Ensure dissemination of relevant information on environment within the unit and to outside bodies, and regularly interact with Government authorities concerned for protection of environment.
- ❖ Maintain appropriate emergency procedures consistent with available technologies to prevent/ control environmental incidents.
- ❖ Also ensure periodic 3rd party environment audits through certification bodies to check efficacy of the Environment Management Systems.
- ❖ Sustain a high degree of environmental awareness through regular promotional campaigns and employee participation through training, safety committees, emergency drills etc.
- ❖ Provide appropriate training to all employees.
- ❖ Report environmental performance to Corporate Environment Cell on a monthly basis.

for M/s AIC Iron Industries Pvt. Ltd.,

Dinesh Adukia
(Director)

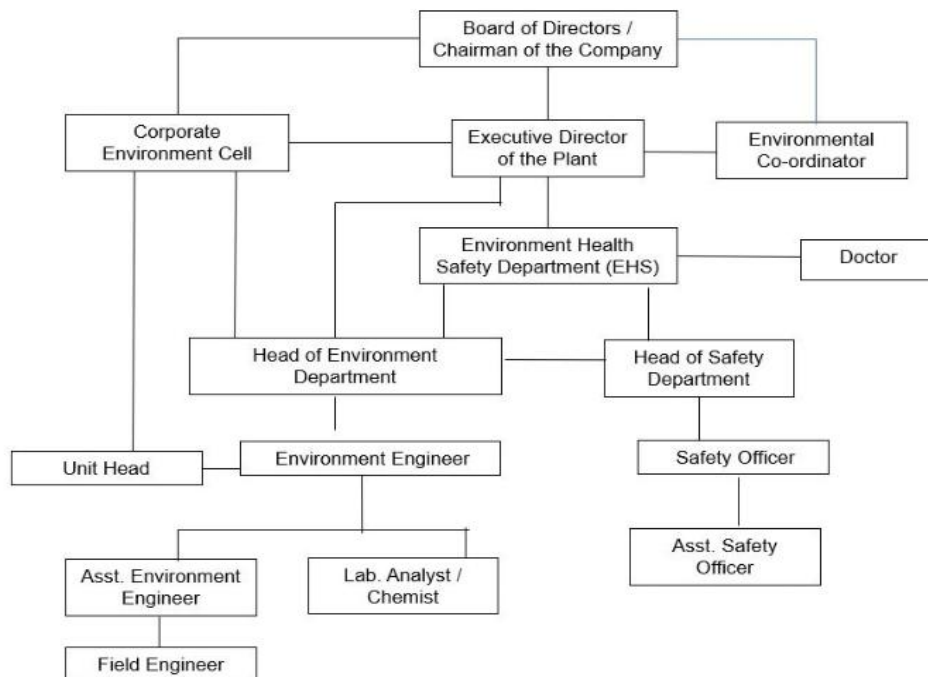
Works : Village Benipur, Post Saltore - 723121, Dist. Purulia (W.B.)

AIC Iron Industries Pvt. Ltd.

25, GANESH CHANDRA AVENUE, 4TH FLOOR, KOLKATA - 700 013
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 E-mail : aic_iron@aicsteel.in • CIN : U27109WB2003PTC097420



The Hierarchy of our Corporate Environment management Cell that will be strictly followed:



for M/s AIC Iron Industries Pvt. Ltd.,

Dinesh Adukia
(Director)

Works : Village Benipur, Post Saltore - 723121, Dist. Purulia (W.B.)

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10.4 HAZARDOUS WASTE MANAGEMENT

The hazardous waste generation from the factory will be Used/Spent Oil. Used oils removed from machineries, gear boxes, compressors etc. and sludge will be collected in drums and temporarily stored in specifically earmarked areas. They will be disposed through the approved agencies.

10.5 ENVIRONMENTAL MANAGEMENT CELL

The Company is already having a full-fledged environmental management cell for taking effective pollution control and environmental protection measures. Following are the functions of environmental management cell:

10.5.1 Functions of Environmental Management Cell

- Responsible operation related to collection, treatment and disposal facilities for air emissions, waste water and solid wastes.
- Routine monitoring of relevant parameters to determine pollution levels.
- Ecological monitoring and green belt maintenance.
- Implementation of environmental management plan.
- Data handling, reporting, liaison with statutory bodies as well as future planning regarding environment management.

10.6 MITIGATORY MEASURES DURING CONSTRUCTION

The impacts of the proposed construction phase on the environment would be basically of transient nature and are expected to wear out gradually on completion of the construction programme. However, once the construction of the units will be completed and its operations started, these operation stage impacts would overlap the impacts due to the construction activities.

The impacts in different aspects of environment due to the construction programmes have been elucidated in **Chapter-4**. In order to mitigate such impacts and restrict them within tolerable levels, the Authorities would adopt the following measures:

Traffic Safety

- ❖ Vehicle shall not exceed the speed limit of 25 km/hr inside the plant premises.
- ❖ All vehicles shall be maintained.
- ❖ The contractor shall avoid traffic congestion and abide by the traffic rules by developing trained and licensed drivers.

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- ❖ All vehicles shall have valid PUC

Fuel and Sanitation

- ❖ The project management shall take adequate steps to ensure suitable sanitary facilities for the workers. These facilities include water supply, sanitary toilets and waste treatment etc.
- ❖ Contractors shall arrange for the supply of fuel to the construction workers so that the local trees are not failed to meet the fuel requirement.

Handling & Storage of Hazardous Chemicals

- ❖ Hazardous chemicals/materials like oils, paints, and other chemicals etc., which are hazardous in nature shall be stored as per stipulated HCM&H Rule 1989.

Emission & Noise Control

- ❖ During construction, **M/s AIC Iron Industries Private Limited** shall take adequate measures (e.g. water spraying) to avoid dust emissions.
- ❖ The Company shall ensure proper maintenance of the construction equipment.
- ❖ Construction material/ the debris shall be transported with proper cover to avoid the fugitive emissions of dust.
- ❖ The equipment shall comply with the Statutory limit of 85 dB(A) (at 1 m. from the source) for noise.

Waste Collection & Disposal

- ❖ Waste has been categorized as: wood, metal, chemicals, paper, plastic etc.
- ❖ The impact of waste shall be reduced through segregated collection.
- ❖ Besides, during mobilization, construction, demobilization and commissioning of the project, the contractor shall minimize the waste burden through proper material selection.
- ❖ The Company shall provide sufficient number of metal containers on-site to store trash and debris resulting from their operations.
- ❖ No waste, regardless of composition, shall be drained to sewers, trenches, ditches or channels.
- ❖ Hazardous waste disposed-off during the construction activities shall be registered in a Waste Log by the contractor. Waste shall be stored in such a way that it is not accessible to unauthorized persons.
- ❖ Waste handling shall be in compliance with applicable Legislation.

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Personal Safety

- ❖ The Company shall provide his workers with Personal Protective Equipment (PPE) (e.g. Helmet, Goggles, Dust Mask, Ear Plug/ Muff, Hand Gloves etc.).
- ❖ The Company shall maintain First-aid Facility at the site & also an ambulance for proper medical care of his workers.

Review of Contractor's HSE performance

- ❖ The Company shall submit the HSE performance periodically.
- ❖ Based on the review by The Company, the contractor shall make suitable changes in the plan and take corrective & preventive actions.

10.7 FIRE AND SAFETY MANAGEMENT

Full-fledged fire fighting facilities will be provided in the plant to tackle any fire contingency. Regular safety audits will be carried out for improving safety performance. Onsite and Offsite Disaster Management Plans shall be developed and mock drills will be conducted at regular intervals to keep the disaster management team in a state of full preparedness.

10.8 ENVIRONMENTAL AWARENESS CAMPAIGN

In addition to training of employees in various aspects of pollution control activities of the plant, programmes like celebration of World Environment Day, World Safety Day, screening of films on environment, tree plantation etc. will be regularly carried out in order to create greater awareness towards environment protection amongst employees and the people in the neighbouring areas.

10.9 LEGAL AND STATUTORY COMPLIANCE

All the environmental standards/ stipulations will be fully maintained by the Company.

The plant will obtain yearly clearance from the State Pollution Control Board for liquid, gases & solid wastes disposal. Specific information in prescribed forms will be submitted as per Water (Prevention & Control of Pollution) Act, Air (Prevention & Control of Pollution) Act etc. It will be supervised that all requirements under these Acts and Rules shall meet.

The engineer-in-charge for the Environmental Cell will prepare these reports with the help of the production engineers.

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10.10 DOCUMENTATION

All the monitoring data, environmental and health related should be stored in systematic manner so that the specific records will be easily available as required.

10.11 INFORMATION DISSEMINATION AND PUBLIC RELATIONS

Everybody now a day is concerned about environmental pollution. A steel plant is, therefore, susceptible to people as a source of local pollution. It is, therefore, needed that people should be provided with environmental data related to the plant so that wrong apprehensions can be removed. This requires a well-planned public relation and information dissemination process so that unnecessary public intervention is avoided. In this connection, The Company will organize different programmes with participation from local bodies, encouraging local community in environmental projects (like tree plantation) etc.

10.12 OCCUPATIONAL HEALTH ACTIVITIES

10.12.1 Introduction

The Occupational Health and Safety Management System is a vital part in Industrial Sectors. In this, Management Health and Safety are taken into consideration. The purpose of the Occupational Health and Safety Management System is as follows:

- ❖ Minimize risk to employees and others
- ❖ Improve business performance
- ❖ Assist the organization to establish image for health and safety.

10.12.2 Approach

The basic approach for the establishment and implementation of the occupational health and safety management system will involve the following steps:

- ❖ Identify the hazards involvement in the activities of the organization.
- ❖ Evaluate the risks which are involved in the performance of these activities.
- ❖ Control these risks to an acceptable level.

All contractor personnel and temporary staff will also be advised to use safety equipment. Even the visitors will be advised to use helmet and nose mask during plant visit.

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10.12.3 STANDARDS FOR THE OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT SYSTEM

As per the standards OHSAS 18001: 1999 / OHSAS 18002 / 2002, the following specification is applicable to the organization as given below:

- ❖ The establishment of an Occupational Health and Safety Management System to eliminate risk to employees and other interested parties.
- ❖ Implement, maintain and continually improve the occupational health and safety management system.
- ❖ Assign itself of its conformance with its stated occupational health and safety policy.

10.12.4 Core Elements of the Occupational Health and Safety Management

The basic core elements are:

- ❖ Occupational Health and Safety Policy
- ❖ Planning
- ❖ Implementation and operation
- ❖ Checking and corrective action
- ❖ Management review

10.12.5 Occupational Health and Safety Policy

It sets an overall direction of the system. It lays down the principals involved as responsibilities, performance requirement, commitments, framework for setting objective and targets.

- ❖ In **M/s AIC Iron Industries Pvt. Ltd.**, the hazards' places shall be identified and the nameplates will also be placed for the safety precaution to the relevant equipment.
- ❖ All the operational parts of the various departments will be identified and assessed.
- ❖ In the operational area, the broad categories of hazards could be mechanical, electrical, substance fire and explosions, which will be carefully monitored.

10.12.6 Structure and Responsibilities

In **M/s AIC Iron Industries Pvt. Ltd.**, the following structure and responsibilities will form occupational health and safety management system:

M/s AIC Iron Industries Pvt. Ltd.	Environmental Impact Assessment for Proposed expansion of existing Steel Plant at Village: Benipur, P.O.: Saltor, P.S.: Neturia, Dist: Purulia, West Bengal	C10 - 18
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- ❖ All HODs of the respective departments will lay down the safety rules and safety status of their work places and they will have the authority to place the manpower accordingly.
- ❖ The communication between the worker and management will be clear about the position of hazards situation.
- ❖ The communication between the worker and management will be clear about the position of hazards situation.
- ❖ The top management of the company provides resources such as human resources, technological resources and financial resources for the implementation and control of the situation.
- ❖ There is a quarterly evaluation of the improvement of the safety and occupational health of the employees.
- ❖ Safety officer monitors the compliance of safety rules.

10.12.7 Training Awareness

In **M/s AIC Iron Industries Pvt. Ltd.**, the workers, selected by their departmental head, training will be given. During training, the following topics will be discussed:

- ❖ The occupational health and safety consequences of their activities.
- ❖ The emergency preparedness and response
- ❖ Importance of the occupational health and safety management system.
- ❖ Training to be taken into account the responsibility, ability and literacy of the person concerned and the nature and the extent of risk involved.

In **M/s AIC Iron Industries Pvt. Ltd.**, there will be a periodic internal audit.

10.12.8 Management Review

In **M/s AIC Iron Industries Pvt. Ltd.**, the necessary information regarding the Occupational Health and Safety Management System will be collected and reviewed.

During First-Aid training programme, classes on occupational health & hygiene will be held for the officers & staff. All employees will be exposed to this training.

10.12.9 Proposed Health Check-up Plan

For the proposed Project pre-employment health check-up will be followed by periodical health check up with special attention to occupational health. The periodicity of occupational health check-up will be followed as per the following schedule:

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Sl. No.	Age Limit (years)	Frequency of Health Check-up
1.	Below 31	Once in 5 years
2.	31 – 40	Once in 4 years
3.	41 – 50	Once in 2 years
4.	Above 50	Once a year

The health check-up will be conducted as per the pre-designed format which will include Chest X-rays, Audiometry, Spirometry, Vision Testing, ECG, Blood and Urine test etc.

Under Pre-employment check-up the following test will be conducted:

- Chest x-rays
- Audiometry
- Spirometry
- Vision testing (Far & Near vision, color vision and any other ocular defect)
- ECG
- Haemogram (examination of the blood)
- Urine (Routine and Microscopic)
- Complete physical examination
 - Musculo-skeletal disorders (MSD)
 - Backache
 - Pain in minor and major joints
 - Fatigue, etc.

Medical records of each employee will be maintained separately and will be updated as per finding during monitoring. Medical records of the employee at the end of his / her term will be updated.

10.12.10 Use of Personnel Protective Equipment (PPE)

The practice of using the Personnel Protective Equipment (PPE) as enlisted in **Table-10.3** shall be strictly followed.

TABLE-10.3
PERSONAL PROTECTIVE EQUIPMENTS

Protection for	Equipment	Protection Against
Head	Safety helmet	Fall of objects/hitting against objects during construction, maintenance, etc.
	Electrical resistance helmet	Electrical shock.
	Welder's leather cap	Splashing of liquid etc.
Eye	Panorama goggles with clear plastic vision	Oil and paint splashes, dust and chips.
	Spectacle-type goggles with blue lens	High temperature flame during furnace work.
Ear	Ear plugs or muffs	High noise level.
Nose	Dust, fume mask Oxygen mask & Air mask	Fine dust particles, fumes & gas
Face	Welding helmet and shield	Welding fumes, sparks and UV rays.
Body	Apron	Falling of hot chips, slag's, etc.
	Safety belt	Falling of persons from height.
	Hand gloves	Heat radiation.
	Electrical resistance gloves	Electric shock.
	Canvas gloves	Contact with oil, grease, etc.
Leg	Safety Shoe	Striking by objects, fall of objects and stepping on sharp or hot objects.

10.13 ENVIRONMENTAL COST

Environmental Cost Component

The total project cost for the proposed project has been estimated to be Rs. 1652 Crores. The capital cost of environmental mitigation measures is estimated to be Rs. 100.0 Crores, which includes:

Items	Cost (in Crores)
Cost of Air Pollution Control Systems	48.0
Cost of Water conservation & Pollution Control	11.0
Cost of Solid Waste Management System	7.0
Green belt development	0.20 *
Noise Reduction Systems	7.0
Occupational Health Management	9.0
Risk Mitigation & Safety Plan	8.9
Environmental Management Department	8.9
GRAND TOTAL	100.0

*(considering Rs.3 lakhs/hectare with 10 years maintenance cost)

The estimated annual cost of environmental mitigation measures for the proposed project has been estimated to be Rs. 10.0 Crores. The annual estimated environmental mitigation costs include:

Items	Cost (in Crores)
Air Pollution Control Systems	5.0
Water conservation & Pollution Control	1.1
Solid Waste Management System	0.7
Green belt	- *
Noise Reduction Systems	0.7
Occupational Health Management	0.9
Risk Mitigation & Safety Plan	0.8
Environmental Management Department	0.8
GRAND TOTAL	10.0

*(considering Rs.3 lakhs/hectare with 10 years maintenance cost)

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CHAPTER-11.0

DISCLOSURE OF CONSULTANTS ENGAGED

Brief Profile of M/S. Envirotech East Pvt. Ltd.

M/s Envirotech East Pvt. Ltd., Kolkata has acquired the status of one of the Prime organizations of the country in undertaking various assignments in the areas like Environmental Impact Assessment, Environment Management Plan, Risk Analysis, Detailed Project Report preparation, Environmental Audit / Statement, Geo-Technical Statement etc.. It was formed in 1988 by Prof. G. D. Agarwal, former Dean, IIT Kanpur and Member Secretary, Central Pollution Control Board. The company maintain a pool of eminent & renowned experts to execute various assignments with the desired degree of perfection.

The manpower, engaged for EIA study for proposed expansion of existing steel plant by installation of 1X0.5 MTPA capacity Sinter Plant, 1X500 M³ capacity MBF, 3x650 TPD DRI Kilns, 6x25 T Induction Furnaces, 1x25 T Electric Arc Furnaces along with 1x15 TPH Slag Crusher unit, Enhancement (through optimization in operation) of the production capacity of 4x15 T + 2X10 T Induction Furnaces (as per EC 2010 & 2023), 3x12 MVA capacity Submerged Arc Furnaces, 1x0.3 MTPA capacity Rolling Mill, Lime Plant (250 TPD), Oxygen Plant (225 TPD), 1x0.5 MTPA capacity Ductile Iron Pipe (DIP) Plant, 60,000 TPA capacity Galvanising Unit along with 4x4000 Nm³/Hr capacity Producer Gas Plant and 100 MW capacity Captive Power Plant (70 MW WHRB + 30 MW AFBC/CFBC) at village Benipur; P.O.: Saltor, P.S.: Neturia, Dist: Purulia in West Bengal by M/s AIC Iron Industries Pvt. Ltd. is given in **Appendix-I**. The company has been endeavouring for continual improvement in its system and it has received accreditation by NABET (QCI), ISO 9001:2015, ISO 14001:2015 and OHSAS 45001:2018 certifications. The Company had obtained NABET accreditation under QCI-NABET Scheme vide certificate no. NABET/EIA/2225/RA 0279 and valid till 12th September, 2025.

The company has a well-equipped laboratory, which is recognized by NABL, QCI as per ISO/IEC 17025:2017 and West Bengal Pollution Control Board.

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OF INDIA**
Creating an Ecosystem for Quality



**National Accreditation Board
for Education and Training**



Certificate of Accreditation

Envirotech East Pvt. Ltd., Kolkata

Bengal Ambuja Coml. Complex, UN-F-13, 1050/1, Survey Park, Kolkata -700075

*The organization is accredited as **Category-A** under the QCI-NABET Scheme for Accreditation of EIA Consultant Organization, Version 3: for preparing EIA-EMP reports in the following Sectors –*

S.No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1	Thermal power plants	4	1 (d)	A
2	Metallurgical industries (ferrous & non-ferrous)	8	3 (a)	A
3	Cement plants	9	3 (b)	A
4	Petroleum refining industry	10	4 (a)	A
5	Coke oven plants	11	4 (b)	A
6	Petrochemical based processing	20	5 (e)	A
7	Synthetic organic chemicals industry	21	5 (f)	A
8	Distilleries	22	5 (g)	A
9	Pulp & paper industry excluding manufacturing of paper from wastepaper and manufacture of paper from ready pulp without bleaching	24	5 (i)	A
10	Ports, harbours, break waters and dredging	33	7 (e)	A
11	Building and construction projects	38	8 (a)	B
13	Townships and Area Development projects	39	8 (b)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in RAAC minutes dated Feb 24, 2023 and posted on QCI-NABET website.

The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no QCI/NABET/ENV/ACO/23/2722 dated March 31, 2023. The accreditation needs to be renewed before the expiry date by Envirotech East Private Limited, Kolkata following due process of assessment.



Sr. Director, NABET
Dated: March 31, 2023

Certificate No.
NABET/EIA/2225/RA 0279

Valid up to
Sept 12, 2025

For the updated List of Accredited EIA Consultant Organizations with approved Sectors please refer to the QCI-NABET website.

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**National Accreditation Board for
Testing and Calibration Laboratories**

CERTIFICATE OF ACCREDITATION

**LABORATORY DIVISION, ENVIROTECH EAST PRIVATE
LIMITED**

has been assessed and accredited in accordance with the standard

ISO/IEC 17025:2017

**"General Requirements for the Competence of Testing &
Calibration Laboratories"**

for its facilities at

100, KALIKAPUR, KOLKATA, WEST BENGAL, INDIA

in the field of

TESTING

Certificate Number: TC-12649

Issue Date: 24/11/2023

Valid Until: 23/11/2025

This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard & the relevant requirements of NABL.
(To see the scope of accreditation of this laboratory, you may also visit NABL website www.nabl-india.org)

Name of Legal Entity: Envirotech East Private Limited

Signed for and on behalf of NABL



N. Venkateswaran
Chief Executive Officer

M/s AIC Iron Industries Pvt. Ltd.	Environmental Impact Assessment for Proposed expansion of existing Steel Plant at Village: Benipur, P.O.: Saltor, P.S.: Neturia, Dist: Purulia, West Bengal	C11 - 4
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APPENDIX-I

Declaration by Experts (as per NABET Scheme Version 3) contributing to the EIA for Proposed expansion of existing steel plant by installation of 1X0.5 MTPA capacity Sinter Plant, 1X500 M³ capacity MBF, 3x650 TPD DRI Kilns, 6x25 T Induction Furnaces, 1x25 T Electric Arc Furnaces along with 1x15 TPH Slag Crusher unit, Enhancement (through optimization in operation) of the production capacity of 4x15 T + 2X10 T Induction Furnaces (as per EC 2010 & 2023), 3x12 MVA capacity Submerged Arc Furnaces, 1x0.3 MTPA capacity Rolling Mill, Lime Plant (250 TPD), Oxygen Plant (225 TPD), 1x0.5 MTPA capacity Ductile Iron Pipe (DIP) Plant, 60,000 TPA capacity Galvanising Unit along with 4x4000 Nm³/Hr capacity Producer Gas Plant and 100 MW capacity Captive Power Plant (70 MW WHRB + 30 MW AFBC/CFBC) at village Benipur; P.O.: Saltor, P.S.: Neturia, Dist: Purulia in West Bengal by M/s AIC Iron Industries Pvt. Ltd.

I, hereby, certify that I am a part of the EIA team in the following capacity that developed the above EIA.

EIA coordinator: 3(a), Metallurgical Industries (Ferrous & Non-ferrous) - both Primary and Secondary, Category "A", NABET #8.

Name: Mr. T. Kundu

Signature:



Date: 19.08.2024

Period of involvement: From April, 2023 and continuing.

Contact information: email: eeplkol@gmail.com

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Functional area experts:

Sl. No.	Functional areas	Name of the expert/s	Involvement (period and task)	Signature	Date
1	Air pollution monitoring, prevention and control (AP)	Mr. T. Kundu (Bachelor of Technology (Chemical Engineering))	From April, 2023 and continuing Finalization of monitoring locations for Ambient Air Quality Monitoring, evaluation of Ambient Air Quality results, suggestions & finalization of air pollution control measures, with client and contribution to overall EIA report preparation.		19.08.2024
2	Water pollution monitoring, prevention and control (WP)	Mr. Asoke Kumar Banerjee (M.Sc. (Chem.))	From April, 2023 and continuing Finalization of sampling locations for surface water and ground water quality monitoring, evaluation of water quality results, analysis of water balance, identification of sources for wastewater generation and give suggestions on suitable water pollution control, exploring the ways for conservation of water, identification & assessment of impacts, finalization of mitigation measures with project proponent and contribution to overall EIA report preparation.		19.08.2024

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3	Solid and hazardous waste management (SHW)	Mr. Asoke Kumar Banerjee (M.Sc. (Chem.))	From April, 2023 and continuing Identification of potential solid & hazardous waste generating sources and their inventorisation, finalization of waste management strategies, identification of impacts, finalization of mitigation measures with project proponent and contribution to overall EIA report preparation.		19.08.2024
4	Socio-economics (SE)	Prof. Pabitra Sengupta (M.Sc. (Economics))	From April, 2023 and continuing Field survey, assessment of the existing socio-economic scenario of the area, assessment of possible changes to socio-economics of the area due to the proposed project and contribution to overall EIA report preparation.		19.08.2024
5	Ecology and biodiversity (EB)	Dr. (Mrs.) Anupam Sinha (Ph.D in Botany) Ms. Puja Ghosh, Team Member (M. Sc. In Environmental Science)	From April, 2023 and continuing Assessment of the existing Ecology & Biodiversity with proper emphasis on eco-sensitive locations, assessment of possible impacts to the biological and ecological environment of the area due to the proposed industrial activity and EIA report preparation.		19.08.2024
6	Hydrology, ground water and water conservation	Dr. Somenath Bhattacharyya (Ph.D in	From April, 2023 and continuing Assessment of existing Geology and hydrology		

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	(HG)	Geology)	of the area, Understanding and representing groundwater conditions, finalization of groundwater sampling locations, finalization of survey findings, identification of probable impact due to proposed industrial activity, suggestion of mitigation measures and contribution to overall EIA report preparation.		19.08.2024
7	Geology (GEO)				
8	Soil Conservation (SC)	Mr. Asoke Kumar Banerjee (M.Sc. (Chem.))	From April, 2023 and continuing Finalization of soil sampling locations, identification of potential sources of impacts due to project, finalization of suitable mitigation measures with project proponent and contribution to overall EIA report preparation.		19.08.2024
9	Meteorology, Air Quality Modeling and Prediction (AQ)	Mr. A K Sinha (Post Graduate in Environment Management)	From April, 2023 and continuing Identification of air emission sources and their inventorisation, prediction of cumulative impacts on ambient air quality due to all identified point & mobile sources, suggestions & finalization of mitigation measures with project proponent and contribution to overall EIA report preparation.		19.08.2024
10	Noise and Vibration (NV)	Mr. R.K. Dasgupta (Bachelor of Engineering)	From April, 2023 and continuing Finalization of noise sampling location and		19.08.2024

M/s AIC Iron Industries Pvt. Ltd.		Environmental Impact Assessment for Proposed expansion of existing Steel Plant at Village: Benipur, P.O.: Saltor, P.S.: Neturia, Dist: Purulia, West Bengal			C11 - 8
		(Mechanical))	analysis of data, identification of impacts, suggestions & finalization of suitable mitigation measures with client and contribution to overall EIA report preparation.		
11	Land use (LU)	Dr. Somenath Bhattacharyya (Ph.D in Geology)	From April, 2023 and continuing Site visit, supervising development of land use maps of study area using GIS tools, finalization of landuse maps, based on ground truth verification, identification of any probable changes due to the proposed industrial activity and contribution to EIA report preparation.		19.08.2024
12	Risk & Hazard (RH)	Mr. T. Kundu (Bachelor of Technology (Chemical Engineering))	From April, 2023 and continuing Identification of major hazards, assessment of risks associated with the proposed project, quantification of the identified risks with the help of the standard software. Preparation of on-site and off-site emergency plan and contribution to overall EIA report preparation.		19.08.2024

M/s AIC Iron Industries Pvt. Ltd.	Environmental Impact Assessment for Proposed expansion of existing Steel Plant at Village: Benipur, P.O.: Saltor, P.S.: Neturia, Dist: Purulia, West Bengal	C11 - 9
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Declaration by the Head of the accredited consultant organization/ authorized person,

I, Asoke Kumar Banerjee, Director, hereby, confirm that the above mentioned experts prepared the EIA Report for proposed expansion of existing steel plant by installation of 1X0.5 MTPA capacity Sinter Plant, 1X500 M³ capacity MBF, 3x650 TPD DRI Kilns, 6x25 T Induction Furnaces, 1x25 T Electric Arc Furnaces along with 1x15 TPH Slag Crusher unit, Enhancement (through optimization in operation) of the production capacity of 4x15 T + 2X10 T Induction Furnaces (as per EC 2010 & 2023), 3x12 MVA capacity Submerged Arc Furnaces, 1x0.3 MTPA capacity Rolling Mill, Lime Plant (250 TPD), Oxygen Plant (225 TPD), 1x0.5 MTPA capacity Ductile Iron Pipe (DIP) Plant, 60,000 TPA capacity Galvanising Unit along with 4x4000 Nm³/Hr capacity Producer Gas Plant and 100 MW capacity Captive Power Plant (70 MW WHRB + 30 MW AFBC/CFBC) at village Benipur; P.O.: Saltor, P.S.: Neturia, Dist: Purulia in West Bengal by M/s AIC Iron Industries Pvt. Ltd.

I also confirm that the consultant organization shall be fully accountable for any misleading information mentioned in this statement.

Signature: 

Name: Asoke Kumar Banerjee

Designation: Director

Name of the EIA consultant organization: M/s Envirotech East Pvt. Ltd.

NABET Certificate No.: NABET/EIA/2225/RA 0279

Issue Date: 31st March, 2023 (Valid upto 12th September, 2025)



WEST BENGAL POLLUTION CONTROL BOARD

(Department of Environment, Government of West Bengal)

Paribesh Bhawan

Bldg. No. 10A, Block – LA, Sector – III, Bidhannagar, Kolkata – 700 106

Tel: 2335-9088 / 5076 / 5079 / 8861 / 7428 / 8211

Fax: (0091) (033) 2335-2813 / 8073 / 5272

Website: www.wbpcb.gov.in

Memo No. 1554

-5/WPB-S/99 (Part-VII)

Date: 26/06/2024

[E-File: WBPCB-15012(14)/1/2021-SEC(WBPCB)-WBPCB]

ORDER

In exercise of power conferred section 17(2) of the Water (Prevention and Control of Pollution) Act, 1974 and under section 17(2) of the Air (Prevention and Control of Pollution) Act, 1981, the West Bengal Pollution Control Board (hereinafter referred as the "State Board") is pleased to recognize the following laboratories for the purposes of environmental monitoring and analysis of parameters, mentioned against respective Laboratories, subject to the terms and conditions as stated in this order:

1. Recognition

1.1 The following 9 (Nine) laboratories are awarded with Recognition for 24 months (01.07.2024 to 30.06.2026)

Recognized Laboratory	M/s. Unitech Environmental Services Pvt. Ltd. 52D/12/1A, Babu Bagan Lane, Kolkata-700031
Approved Parameters	Group-B: Water and Waste Water Group-B ₁ (Physical Tests): pH, Total suspended solids. Group-B ₄ (Organics-General & Trace Organics): Bio-chemical oxygen demand (BOD), Chemical oxygen demand (COD), Oil & Grease.
Recognized Laboratory	M/s. Pollution and Project Consultants P-145, Bangur Avenue, Block-A, Kolkata-700055
Approved Parameters	Group-A: Air and Noise Group-A ₁ (Ambient Air): Nitrogen dioxide as NO ₂ , Sulphur dioxide (SO ₂), PM ₁₀ , PM _{2.5} , Ammonia, Ozone. Group-A ₂ (Fugitive Emission): Total Suspended Particulate Matter (TSPM). Group-A ₄ (Stack Gases/Source Emission): Particulate matter, Sulphur dioxide, Velocity & flow, Carbon dioxide, Carbon monoxide, Temperature, Oxygen, Oxides of nitrogen. Group-A ₅ (Noise Monitoring): Ambient Noise (Leq, L _{max} , L _{min}). Group-B: Water and Waste Water Group-B ₁ (Physical Tests): Conductivity, Colour, pH, Fixed & volatile solids, Total solids, Total dissolved solids, Total suspended solids, Turbidity, Temperature, Odour. Group-B ₂ (Inorganic-General and Non-metallic): Alkalinity, Ammoniacal nitrogen, Chloride, Chlorine residual, Dissolved oxygen, Total hardness, Total kjehldal nitrogen (TKN). Group-B ₃ (Inorganic-Metals): Calcium (Ca), Magnesium (Mg). Group-B ₄ (Organics-General & Trace Organics): Bio-chemical oxygen demand (BOD), Chemical oxygen demand (COD), Oil & Grease. Group-B ₅ (Microbiological Tests): Total Coliform, Faecal Coliform, E Coli. Group-B ₉ (Soil/ Sludge/Sediment and Solid Waste): Cation Exchange Capacity (CEC), Electrical Conductivity (EC), Nitrogen available, Organic carbon/matter (chemical method), pH, Soil moisture, TKN, Calcium, Chloride, Magnesium, Total water soluble salt.
Recognized Laboratory	M/s. S. M. Scientific Service 486, Dum Dum Park, Kolkata-700055
Approved Parameters	Group-A: Air and Noise Group-A ₁ (Ambient Air): Nitrogen dioxide as NO ₂ , Sulphur dioxide (SO ₂), PM ₁₀ . Group-A ₂ (Fugitive Emission): Total Suspended Particulate Matter (TSPM). Group-A ₃ (Meteorological Monitoring): Ambient Temperature, Wind direction, Wind speed, Relative Humidity.

	Group-B₉ (Soil/ Sludge/Sediment and Solid Waste): Boron, Cation Exchange Capacity (CEC), Electrical Conductivity (EC), Nitrogen available, Organic carbon/matter (chemical method), pH, Phosphorous (available), Phosphate (ortho), Phosphate (total), Potassium, SAR in soil extract, Sodium, Soil moisture, TKN, Calorific value, Bicarbonate, Calcium, Chloride, Colour, Heavy metal, Magnesium, Mechanical soil analysis, Nitrate, Nitrite, PAH, Pesticide, Potash (available), Sulphate, TOC, Total water soluble salt, Water holding capacity.
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1.2 The following 6 (Six) laboratories are awarded with Recognition for 12 months (01.07.2024 to 30.06.2025)

Recognized Laboratory	M/s. Envirotech East Private Limited 100, Kalikapur, Madurdaha, Kolkata-700107
Approved Parameters	Group-A: Air and Noise Group-A₁ (Ambient Air) : Nitrogen dioxide as NO₂, Sulphur dioxide (SO₂), PM₁₀, PM_{2.5}, Ammonia, Carbon monoxide, Ozone, Lead, Chlorine, Fluoride (Particulate/ Gaseous), Non methane hydrocarbon, Methane, Benzene, Benzo(a)pyrene, Volatile Organic Carbon, Nickel, Arsenic. Group-A₂ (Fugitive Emission) : Total Suspended Particulate Matter (TSPM). Group-A₃ (Meteorological Monitoring): Ambient Temperature, Wind direction, Wind speed, Relative Humidity, Solar radiation, Rain fall. Group-A₄ (Stack Gases/Source Emission): Particulate matter, Sulphur dioxide, Velocity & flow, Carbon dioxide, Carbon monoxide, Temperature, Oxygen, Oxides of nitrogen, Acid mist, Ammonia, Chlorine, Fluoride (Particulate/ Gaseous), Total Hydro carbon, Hydrogen Sulphide, Carbon disulphide. Group-A₅ (Noise Monitoring): Ambient Noise (L_{eq}, L_{max}, L_{min}), Noise Source measurement. Group-B: Water and Waste Water Group-B₁ (Physical Tests): Conductivity, Colour, pH, Fixed & volatile solids, Total solids, Total dissolved solids, Total suspended solids, Turbidity, Temperature, Odour, Salinity, Settleable solids, Sludge volume index (SVI). Group-B₂ (Inorganic-General and Non-metallic): Acidity, Alkalinity, Free Ammonia, Ammoniacal nitrogen, Chloride, Chlorine residual, Dissolved oxygen, Dissolved Oxygen (% saturation), Fluoride, Total hardness, Total kjehldal nitrogen (TKN), Nitrite nitrogen, Nitrate nitrogen, Total Nitrogen, Phosphate, Dissolved Phosphate, Total Phosphorus, Sulphate, Carbon dioxide, Chlorine demand, Sulphite, Silica, Cyanide, Sulphide. Group-B₃ (Inorganic-Metals): Boron (B), Cadmium (Cd), Calcium (Ca), Chromium (Cr) Total, Chromium (Cr) Hexavalent, Copper (Cu), Iron (Fe), Lead (Pb), Magnesium (Mg), Mercury (Hg), Nickel (Ni), Potassium (K), Sodium (Na), Sodium absorption ratio (SAR), Zinc (Zn), Arsenic (As), Aluminium (Al), Beryllium (Be), Lithium (Li), Manganese (Mn), Selenium (Se), Silver (Ag), Strontium (Sr), Tin (Sn), Antimony (Sb), Vanadium (V). Group-B₄ (Organics-General & Trace Organics): Bio-chemical oxygen demand (BOD), Chemical oxygen demand (COD), Oil & Grease, Phenol, Surface Active Agents, Anionic Detergents. Group-B₅ (Microbiological Tests): Total Coliform, Faecal Coliform, Faecal Streptococci, E Coli, Total Plate Count, Enterococcus. Group-B₈ (Characterization of Hazardous waste): Preparation of Leachate (TCLP extract/water extract), Measurement of heavy metals/pesticides in the waste/leachate. Group-B₉ (Soil/ Sludge/Sediment and Solid Waste): Boron, Cation Exchange Capacity (CEC), Electrical Conductivity (EC), Nitrogen available, Organic carbon/matter (chemical method), pH, Phosphorous (available), Phosphate (ortho), Phosphate (total), Potassium, SAR in soil extract, Sodium, Soil moisture, TKN, Ammonia, Bicarbonate, Calcium, Calcium carbonate, Chloride, Colour, Heavy metal, Magnesium, Mechanical soil analysis, Nitrate, Nitrite, Potash (available), Sulphate, Sulphur, TOC, Water holding capacity.

Recognized Laboratory	M/s. Quality Control Laboratory, Haldia Refinery Indian Oil Corporation Limited, PO-Haldia Oil Refinery, Purba Medinipur-721606
Approved Parameters	Group-B: Water and Waste Water Group-B₁ (Physical Tests): Conductivity, pH, Total dissolved solids, Total suspended solids, Turbidity, Temperature. Group-B₂ (Inorganic-General and Non-metallic): Alkalinity, Ammoniacal nitrogen, Chloride, Dissolved oxygen, Total hardness, Phosphate, Silica, Cyanide, Sulphide. Group-B₄ (Organics-General & Trace Organics): Bio-chemical oxygen demand (BOD), Chemical oxygen demand (COD), Oil & Grease, Phenol.
Recognized Laboratory	M/s. Greenvision Urvashi Malhar, Phase-II, MEAV-25, Bengal Ambuja Housing Complex, City Centre, Durgapur-713216
Approved Parameters	Group-A: Air and Noise Group-A₁ (Ambient Air) : Nitrogen dioxide as NO₂, Sulphur dioxide (SO₂), PM₁₀, PM_{2.5}, Ammonia. Group-A₂ (Fugitive Emission) : Total Suspended Particulate Matter (TSPM). Group-A₃ (Meteorological Monitoring): Ambient Temperature, Wind direction, Wind speed, Relative Humidity, Rain fall. Group-A₄ (Stack Gases/Source Emission): Particulate matter, Sulphur dioxide, Velocity & flow, Carbon dioxide, Carbon monoxide, Temperature, Oxygen, Oxides of nitrogen. Group-A₅ (Noise Monitoring): Ambient Noise (Leq, L_{max}, L_{min}). Group-B: Water and Waste Water Group-B₁ (Physical Tests): Conductivity, pH, Total solids, Total dissolved solids, Total suspended solids, Turbidity, Temperature. Group-B₂ (Inorganic-General and Non-metallic): Acidity, Alkalinity, Chloride, Chlorine residual, Dissolved oxygen, Total hardness, Dissolved Phosphate, Sulphate, Silica. Group-B₃ (Inorganic-Metals): Calcium (Ca), Chromium (Cr) Hexavalent, Iron (Fe), Magnesium (Mg). Group-B₄ (Organics-General & Trace Organics): Bio-chemical oxygen demand (BOD), Chemical oxygen demand (COD), Oil & Grease.
Recognized Laboratory	M/s. West Bengal Waste Management Limited (A division of Ramky Enviro Engg. Ltd.) JL NO. 103, Mouza- Purba Srikrishnapur, Haldia, Purba Medinipur-721635
Approved Parameters	Group-A: Air and Noise Group-A₁ (Ambient Air) : Nitrogen dioxide as NO₂, Sulphur dioxide (SO₂), PM₁₀, PM_{2.5}, Ammonia, Carbon monoxide, Ozone, Lead, Nickel, Arsenic. Group-A₂ (Fugitive Emission) : Total Suspended Particulate Matter (TSPM). Group-A₃ (Meteorological Monitoring): Ambient Temperature, Wind direction, Wind speed, Relative Humidity, Rain fall. Group-A₄ (Stack Gases/Source Emission): Particulate matter, Sulphur dioxide, Velocity & flow, Carbon dioxide, Carbon monoxide, Temperature, Oxygen, Oxides of nitrogen, Ammonia, Total Hydro carbon, Hydrogen Sulphide, Carbon disulphide. Group-A₅ (Noise Monitoring): Ambient Noise (Leq, L_{max}, L_{min}). Group-B: Water and Waste Water Group-B₁ (Physical Tests): Conductivity, Colour, pH, Fixed & volatile solids, Total solids, Total dissolved solids, Total suspended solids, Turbidity, Temperature, Salinity, Settleable solids, Sludge volume index (SVI). Group-B₂ (Inorganic-General and Non-metallic): Acidity, Alkalinity, Ammoniacal nitrogen, Chloride, Chlorine residual, Dissolved oxygen, Fluoride, Total hardness, Total kjehldal nitrogen (TKN), Nitrite nitrogen, Nitrate nitrogen, Phosphate, Sulphate, Carbon dioxide, Sulphite, Silica, Cyanide, Sulphide. Group-B₃ (Inorganic-Metals): Boron (B), Cadmium (Cd), Calcium (Ca), Chromium (Cr) Total, Chromium (Cr) Hexavalent, Copper (Cu), Iron (Fe), Lead (Pb), Magnesium (Mg), Mercury (Hg), Nickel (Ni),

		PAH, Pesticide, Potash (available), Sulphate, Sulphur, TOC, Total water soluble salt, Water holding capacity.
Recognized Laboratory		M/s. West Bengal Waste Management Limited Unit-II, Saltora CHW-TSDF-JL No. 80, Vill- Pabayan, P. S. Saltora, Dist-Bankura-722158
Approved Parameters		Group-A: Air and Noise Group-A₁ (Ambient Air): PM ₁₀ , PM _{2.5} . Group-A₂ (Fugitive Emission): Total Suspended Particulate Matter (TSPM). Group-A₃ (Meteorological Monitoring): Ambient Temperature, Wind direction, Wind speed, Relative Humidity, Solar radiation, Rain fall.
		Group-B: Water and Waste Water Group-B₁ (Physical Tests): Conductivity, Colour, pH, Fixed & volatile solids, Total solids, Total dissolved solids, Total suspended solids, Temperature, Odour. Group-B₂ (Inorganic-General and Non-metallic): Acidity, Alkalinity, Ammoniacal nitrogen, Chloride, Chlorine residual, Dissolved oxygen, Total hardness, Total kjehldal nitrogen (TKN), Sulphide. Group-B₃ (Inorganic-Metals): Calcium (Ca), Magnesium (Mg), Potassium (K), Sodium (Na). Group-B₄ (Organics-General & Trace Organics): Chemical oxygen demand (COD), Oil & Grease. Group-B₅ (Soil/ Sludge/Sediment and Solid Waste): Electrical Conductivity (EC), Organic carbon/matter (chemical method), pH, Potassium, Sodium, Soil moisture, TKN, Ammonia, Chloride, Colour.

2.0 Terms and conditions:

- 2.1 The Laboratories should maintain Certified Reference Materials/Standard Reference Materials along with valid certificate of Analysis (CoA) related to the parameters for which recognition is granted.
- 2.2 The Laboratories should calibrate all utility equipment, volumetric glassware and sampling instruments through NABL accredited Calibration Laboratory periodically and shall maintain records with traceability. The Laboratories should also perform internal calibration checks during validity of calibration period.
- 2.3 The Laboratories should properly prepare standard curves periodically as per their used method depending on analyte concentration range and shall perform standard checks during testing.
- 2.4 The Laboratories should maintain documents on Method Validation, Detection Limits (LOD, LOQ), Measurement Uncertainty etc.
- 2.5 The Laboratories should perform Internal Quality Control programme like repeat testing, remnant testing, participation in Inter Laboratory Comparison (ILC)/Proficiency Testing (PT) Programme, Intra-Laboratory Comparison etc.
- 2.6 The Laboratories should maintain the system of coding of samples to ensure impartiality and confidentiality in test procedure.
- 2.7 The Laboratories should maintain dedicated Log Books for Instruments and Analysis Registers of each parameter.
- 2.8 The Laboratories should maintain Stock Registers for chemicals, glassware, thimbles, Filter Papers to verify stock position, consumption pattern, reordering level etc.
- 2.9 Standard method documents (e.g. APHA methods, IS methods, USEPA methods etc.) should be made accessible to the Laboratory personnel and the Standard Operating Procedures/Work Instructions of analytical processes should be made available at working areas.
- 2.10 The Laboratories, to which recognition for PM_{2.5} parameter in Ambient Air has been granted, should possess Electronic Balance of having readability minimum upto 5th place of decimal.
- 2.11 The Laboratories should train their personnel on regular intervals for capacity building on sampling methodology and analytical procedure to ensure quality analysis.
- 2.12 The Laboratories should upgrade instrumental analysis (handling, operation and practice) for successful implementation of standards to improve data quality.
- 2.13 If any Laboratory is not equipped with proper facilities and infrastructure to execute the test/analysis, the same should be informed to the State Board within fifteen (15) days of the discontinuation of test.
- 2.14 The laboratories should not change the location without prior intimation to the State Board and in case of any change of address, the concerned Laboratory should inform the State Board within fifteen (15) days of closure of activity in the address.

- 2.15 Information of any Kinship and any relation of any Laboratory owner with any State Board employee must be disclosed to the State Board.
- 2.16 The Laboratories should not engage itself to any activity unlawful under the law of the land.
- 2.17 The Laboratories may obtain NABL accreditation as per ISO/IEC 17025:2017 for the parameters for which recognition has been recommended.

Periodic surveillance of the recognized Laboratories may be under taken by the State Board to assess its functioning, systematic operation and reliability of data generated at the Laboratory. In case of any non-compliance, the recognition may be revoked, withdrawn or suspended including initiation of legal action under extant laws.

The Laboratories, to which recognition is recommended for less than 24 months, may submit a request to the State Board, before two months of expiry of provisional recognition, for consideration of extension of recognition, with documentary evidence towards corrective actions taken by them against Non-Compliances raised during inspection. However, if the laboratory is found to be still non-complied, their further extension of recognition may not be considered.


26/6/2024
(Dr. Rajesh Kumar)
Member Secretary, WBPCB



File No: IA-J-11011/566/2008-IA-II(IND-I)
Government of India
Ministry of Environment, Forest and Climate Change
IA Division



Dated 10/06/2024



To,

M/s AIC IRON INDUSTRIES PVT. LTD.
25, Ganesh Chandra Avenue, 4th Floor, Kolkata, WEST BENGAL-700013
Email: manojpip863689@gmail.com

Subject: **Proposed expansion of existing steel plant by installation of 1X0.5 MTPA capacity Sinter Plant, 1X500 M3 capacity MBF, 3x650 TPD DRI Kilns, 6x25 T Induction Furnaces, 1x25 T Electric Arc Furnaces along with 1x15 TPH Slag Crusher unit, Enhancement (through optimization in operation) the production capacity of 4x15 T + 2X10 T Induction Furnaces (as per EC 2010 & 2023), 3x12 MVA capacity Submerged Arc Furnaces, 1x0.3 MTPA capacity Rolling Mill, Lime Plant (250 TPD), Oxygen Plant (225 TPD), 1x0.5 MTPA capacity Ductile Iron Pipe (DIP) Plant, 60,000 TPA capacity Galvanising Unit along with 4x4000 Nm³/Hr capacity Producer Gas Plant and 100 MW capacity Captive Power Plant (70 MW WHRB + 30 MW AFBC/CFBC) by M/s AIC Iron Industries Private Limited, located at Village: Benipur, P.O. : Saltor, P.S. Neturia, District: Purulia in West Bengal – Grant of TOR -Regarding.**

Sir/Madam,

This has reference to online application of M/s. AIC Iron Industries Private Limited vide proposal no. IA/WB/IND1/439089/2023 dated 06.04.2024 along with the application in prescribed format (CAF, Form – I Part A & B), copy of pre-feasibility report and proposed ToRs for undertaking detailed EIA study as per the EIA Notification, 2006 for the project mentioned above. The proposed project activity is listed at schedule no. 3(a) Metallurgical Industries (ferrous & non-ferrous) and 1(d) Thermal Power Plants under Category “A” of the schedule of the EIA Notification, 2006 and appraised at Central Level.

2. The particulars of the proposal are as below :

(i) TOR Identification No.	TO23A1001WB5422989N
(ii) File No.	IA-J-11011/566/2008-IA-II(IND-I)
(iii) Clearance Type	TOR
(iv) Category	A
(v) Project/Activity Included Schedule No.	3(a) Metallurgical Industries (ferrous and non ferrous),1(d) Thermal Power Plants
(vi) Sector	Industrial Projects - 1

(vii) Name of Project	Proposed expansion of existing steel plant.
(viii) Name of Company/Organization	AIC IRON INDUSTRIES PVT LTD
(ix) Location of Project (District, State)	PURULIA, WEST BENGAL
(x) Issuing Authority	MoEF&CC
(xii) Applicability of General Conditions	no
(xiii) Applicability of Specific Conditions	no

3. The proposal cited above was considered in 58th meeting of the EAC for Industry-I sector held on 14th and 15th May, 2024. The minutes of the meeting and all the project documents are available on PARIVESH portal which can be accessed at <https://parivesh.nic.in>

4. The project of M/s AIC Iron Industries Private Limited located at village: Benipur, P.O. : Saltora, P.S. Neturia, District: Purulia, West Bengal is for expansion of existing steel plant by installation of 1X0.5 MTPA capacity Sinter Plant, 1X500 M3 capacity MBF, 3x650 TPD DRI Kilns, 6x25 T Induction Furnaces, 1x25 T Electric Arc Furnaces along with 1x15 TPH Slag Crusher unit, Enhancement (through optimization in operation) the production capacity of 4x15 T + 2X10 T Induction Furnaces (as per EC 2010 & 2023), 3x12 MVA capacity Submerged Arc Furnaces, 1x0.3 MTPA capacity Rolling Mill, Lime Plant (250 TPD), Oxygen Plant (225 TPD), 1x0.5 MTPA capacity Ductile Iron Pipe (DIP) Plant, 60,000 TPA capacity Galvanising Unit along with 4x4000 Nm³/Hr capacity Producer Gas Plant and 100 MW capacity Captive Power Plant (70 MW WHRB + 30 MW AFBC/CFBC). Environmental site settings are given as **Annexure I**, and unit configuration as **Annexure II**.

5. The existing environmental clearances vide Letter No. J-11011/566/2008-IA II (I), dated 27.10.2010 and Letter No. J-11011/566/2008-IA II (I), dated 04.01.2023 by MoEF&CC. Three (3) Consent to Operates (CTOs) for the existing units was accorded by West Bengal Pollution Control Board (WBPCB) vide Memo No. 194-WPBA/Red/Prt/Cont/216/07 dated 04.05.2023, Memo No. 724-WPBA/Red/Prt/Cont(216)/07 dated 07.12.2023 and Memo No. 740-WPBA/Red/Prt/Cont(216)/07 dated 12.12.2023. The validity of all the three (3) CTOs is up to 31.03.2028.

6. Water requirement for existing units & units under Implementation / to be implemented is 509.5 m³ /day. The water requirement for the proposed project is estimated as 3325 m³ /day. Thus, total water requirement after expansion will be 3,834.5 m³ /day. The water will be sourced from Damodar River through DVC supply. No ground water shall be extracted.

7. The total power requirement after expansion will be estimated as 223.5 MW which will be sourced from Captive Power Plant & DVC supply.

8. The capital cost of the proposed expansion project is Rs. 1652 Crores. The employment generation from the proposed project during operational phase will be 1600 persons.

9. It has been reported by PP that, there is no violation under EIA Notification, 2006/court case/show cause/direction related to the project under consideration.

Deliberations of the Committee

10. The EAC noted the following:

- i. The instant proposal is for expansion of existing steel plant by installation of 1X0.5 MTPA capacity Sinter Plant, 1X500 M3 capacity MBF, 3x650 TPD DRI Kilns, 6x25 T Induction Furnaces, 1x25 T Electric Arc Furnaces along with 1x15 TPH Slag Crusher unit, Enhancement (through optimization in operation) the production capacity of 4x15 T + 2X10 T Induction Furnaces (as per EC 2010 & 2023), 3x12 MVA capacity Submerged Arc Furnaces, 1x0.3 MTPA capacity Rolling Mill, Lime Plant (250 TPD), Oxygen Plant (225 TPD), 1x0.5 MTPA capacity Ductile Iron Pipe (DIP) Plant, 60,000 TPA capacity Galvanising Unit along with 4x4000 Nm³/Hr capacity Producer Gas Plant and 100 MW capacity Captive Power Plant (70 MW WHRB + 30 MW AFBC/CFBC).
- ii. The existing project was accorded environmental clearances vide Letter No. J-11011 / 566/2008-IA II (I), dated 27.10.2010 and Letter No. J-11011 / 566/2008-IA II (I), dated 04.01.2023 by MoEF&CC. Three (3) Consent to Operates (CTOs) for the existing units was accorded by West Bengal Pollution Control Board (WBPCB) vide Memo No. 194-WPBA/Red/Prt/Cont/216/07 dated 04.05.2023, Memo No. 724-WPBA/Red/Prt/Cont(216)/07 dated 07.12.2023 and Memo No. 740-WPBA/Red/Prt/Cont(216)/07 dated 12.12.2023. The validity of all the three (3) CTOs is up to 31.03.2028.
- iii. The EAC took into consideration the drone survey of the project site and kml file on the Google Earth presented by the project proponent along with DSS of the project site on PARIVESH and made following deliberations accordingly.
- iv. The PP submitted that total area is 30.25 ha [Private land]. Out of the total land of 30.25 Hectares (74.74 Acres), 20.82 Hectares (51.44 acres) private land are already acquired. The remaining 9.43 Hectares (23.30 acres) is in the process of Acquisition. The EAC opined that PP shall complete the land acquisition and conversion for industrial purpose and submit the credible documents with the EIA/EMP Report.
- v. There are sensitive areas within the study area of the project site. The EAC is of the opinion that PP shall prepare and include in the EIA/EMP Report the environmental safeguard measures to minimise the impact of the project activities on these sensitive areas.
- vi. As reported, Damodar River is at a distance of 2.8 km in NW of the project site. PP has reported that as per Annual Flood Report 2021 published by the Irrigation & Waterways Directorate, Govt. of West Bengal, Kolkata, the maximum flood level of River Damodar at Panchet Dam (which is around 6 km from the project site in NW direction) is 129.54 m (425 ft) whereas the Above Mean Sea Level of the Project site is 160 m. There are also water bodies are present within the study area of the project site. The EAC is of the opinion that water bodies shall not be disturbed. Mitigation measures w.r.t. safeguarding the water bodies shall be prepared and submitted.
- vii. The total water requirement after expansion is proposed as 3834.5 m³/day which is proposed to be sourced from Damodar River through DVC supply. The EAC is of the opinion that PP shall obtain necessary permission in this regard. No ground water extraction is permitted.

Recommendations of the Committee

11. After deliberations, the Committee recommended the project proposal for prescribing following specific ToRs for undertaking detailed EIA and EMP study alongwith Public Hearing in addition to the generic ToRs enclosed at Annexure-III read with additional ToRs at Annexure-IV:

- (i) There are sensitive areas within the study area of the project site. Proponent shall prepare appropriate environmental safeguard measures to minimise the impact of the project activities on these sensitive areas.
- (ii) There are water bodies are present within the study area of the project site. The PP shall include in the EIA/EMP

report suitable steps /conservation plan along with contouring (close intervals), Run -off calculations, disposal etc. A robust and full proof Drainage Conservation scheme to protect the natural drainage and its flow parameters; along with Soil conservation scheme and multiple Erosion control measures shall be prepared and included in EIA/EMP Report.

(iii) Water requirement of 3834.5 m³/day shall be sourced from Damodar River through DVC supply. PP shall obtain necessary water permission from the Competent Authority. No ground water extraction is permitted.

(iv) Annual Wind Rose Diagram must be included in the EIA/EMP Report. For this annual data may be obtained from secondary sources, such as IMD. This is apart from the seasonal Wind Rose Diagram for which data are generated by the industry.

Decision of MoEF&CC

12. The undersigned is directed to inform that Ministry of Environment, Forest and Climate Change has examined the proposal in accordance with the Environment Impact Assessment (EIA) Notification, 2006 & further amendments thereto and after accepting the recommendations of the Expert Appraisal Committee (Industry-1) hereby decided to accord above-said specific ToRs, in addition to the standard ToRs and Sector Specific ToRs as enclosed at **Annexure III** read with additional ToRs at **Annexure-IV** for carrying out detailed EIA/EMP for the above project.

13. It is requested that the draft EIA Report may be prepared in accordance with the above-mentioned specific ToRs and enclosed generic ToRs and additional ToRs and thereafter further necessary action may be taken for obtaining Environment Clearance in accordance with the procedure prescribed under the EIA Notification, 2006 as amended.

14. The ToRs are valid for a period of four years from date of issue of this letter as per the Ministry's Notification S.O. 751 (E) dated 17/02/2020.

15. This issue with the approval of the Competent Authority.

(Dr. R. B. Lal)

Scientist 'F'/ Director

Tel: 011-20819346

Email: rb.lal@nic.in

Copy To

1. The Secretary, Department of Environment, Government of West Bengal, Secretariat Kolkata.
2. The Secretary, Department of Forests, Government of West Bengal, Kolkata.
3. The Director General of Forest, Ministry of Environment, Forest and Climate Change, New Delhi.
4. The Principal Chief Conservator of Forests, Government of West Bengal, Block LA, 10A Sector-III, Salt Lake City, Kolkata-700098.
5. The Deputy Director General of Forests (C), Integrated Regional Office, Ministry of Environment, Forest and Climate Change, IB-198, Sector-II, Salt Lake City, Kolkata – 700106
6. The Member Secretary, Central Pollution Control Board, CBD-Cum-Office Complex, East Arjun Nagar, New Delhi-110 032.
7. The Member Secretary, West Bengal State Pollution Control Board, Paribesh Bhawan, 10A- Block LA, Sector –III, Salt Lake City, Kolkata – 700 098.
8. The Member Secretary, Central Ground Water Authority, Jamnagar House, 18/11, Man Singh Road Area, New Delhi 110001.
9. Monitoring Cell, Ministry of Environment, Forest and Climate Change, Indira Paryavaran Bhawan, Jor Bagh Road, New Delhi.
10. District Collector, Puruliya District, West Bengal.

Annexure 1**Specific Terms of Reference for (Metallurgical Industries (Ferrous And Non Ferrous))****1. Specific**

S. No	Terms of Reference
1.1	PP shall complete the land acquisition and conversion for industrial purpose and submit the credible documents with the EIA/EMP Report.
1.2	There are sensitive areas within the study area of the project site. Proponent shall prepare appropriate environmental safeguard measures to minimise the impact of the project activities on these sensitive areas.
1.3	There are water bodies are present within the study area of the project site. The PP shall include in the EIA/EMP report suitable steps /conservation plan along with contouring (close intervals), Run - off calculations, disposal etc. A robust and full proof Drainage Conservation scheme to protect the natural drainage and its flow parameters; along with Soil conservation scheme and multiple Erosion control measures shall be prepared and included in EIA/EMP Report.
1.4	Water requirement of 3834.5 m ³ /day shall be sourced from Damodar River through DVC supply. PP shall obtain necessary water permission from the Competent Authority. No ground water extraction is permitted.
1.5	Annual Wind Rose Diagram must be included in the EIA/EMP Report. For this annual data may be obtained from secondary sources, such as IMD. This is apart from the seasonal Wind Rose Diagram for which data are generated by the industry.

Additional Terms of Reference

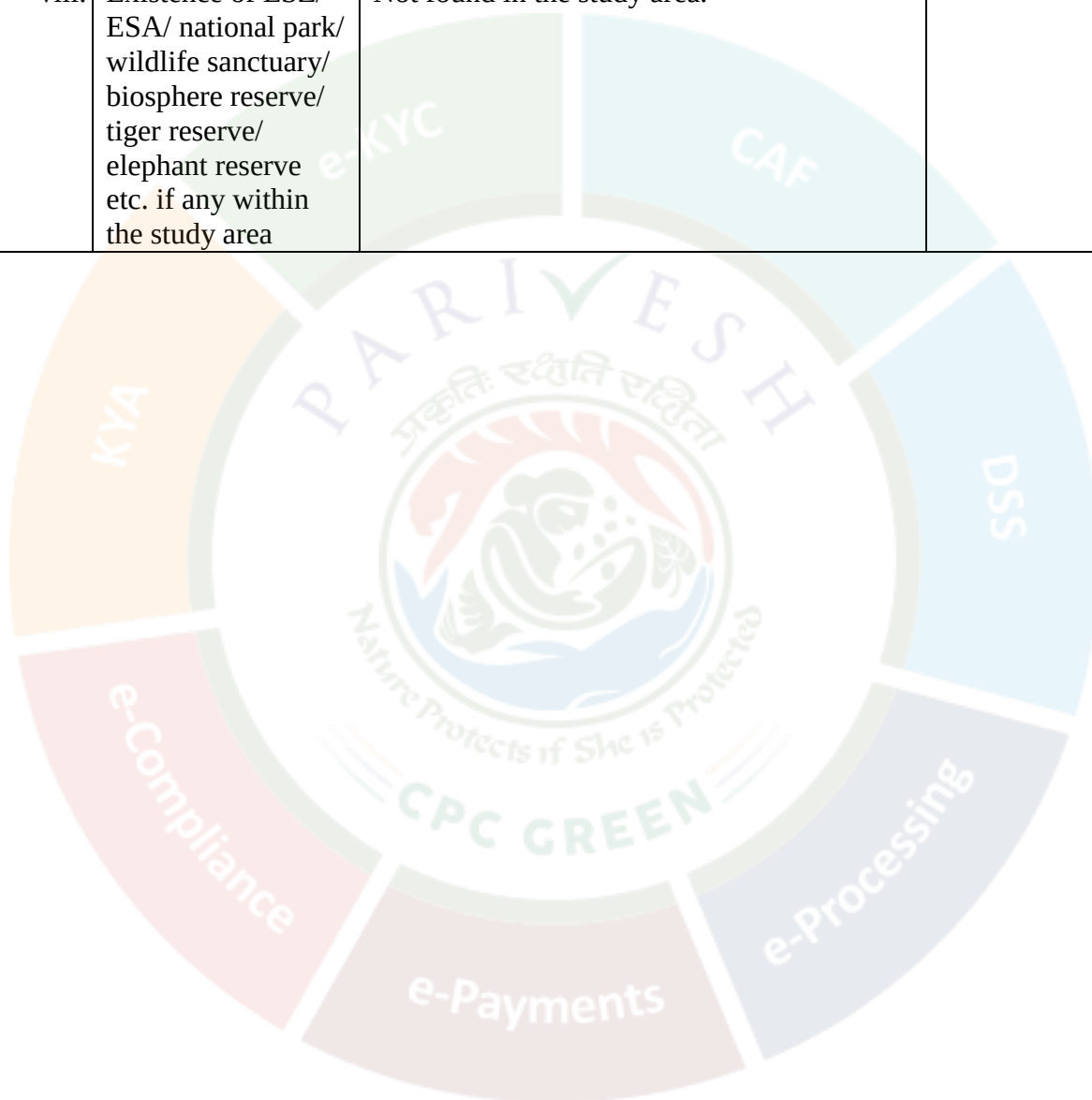
1. This TOR is granted subject to final outcome of Hon'ble Supreme Court of India, Hon'ble High Court, Hon'ble NGT and any other Court of Law, if any, as may be applicable to this project.

2. This TOR granted to the project/ activity is strictly under the provisions of the EIA Notification, 2006 and its amendments issued from time to time. It does not tantamount/ construe to approvals/ consent/ permissions etc., required to be obtained or standards/conditions to be followed under any other Acts/Rules/Subordinate legislations, etc., as may be applicable to the project.

Environmental site settings:

S. No.	Particulars	Details			Remarks
i.	Total Land	30.25 ha [Private: 30.25 ha]			
ii.	Land acquisition details as per MoEF&CC O.M. dated 7/10/2014	Out of the total land of 30.25 Hectares (74.74 Acres), 20.82 Hectares (51.44 acres) private land are already acquired. The remaining 9.43 Hectares (23.30 acres) is in the process of Acquisition.			
iii.	Existence of habitation & involvement of R&R, if any.	Project Site : Village Benipur			No R&R issue involved in the proposed project
iv.	Latitude and Longitude of all corners of the project site.	POINT	LATITUDE	LONGITUDE	
		A	23°39'31.71"N	86°47'57.73"E	
		B	23°39'21.81"N	86°47'55.63"E	
		C	23°39'24.57"N	86°47'41.23"E	
		D	23°39'30.20"N	86°47'42.45"E	
		E	23°39'31.47"N	86°48'1.41"E	
		F	23°39'42.54"N	86°48'6.84"E	
		G	23°39'34.93"N	86°48'18.44"E	
		H	23°39'23.26"N	86°48'9.48"E	
v.	Elevation of the project site	160 m above mean sea level (AMSL).			
vi.	Involvement of Forest land if any.	No forest land is involved in the project site.			
vii.	Water body (Rivers, Lakes Pond, Nala, Natural Drainage, Canal etc.) exists within the project site as well as study area	Project site: There is no water body within the Project Site.			As per Annual Flood Report 2021 published by the Irrigation & Waterways Directorate, Govt. of West Bengal, Kolkata, the maximum flood level of River Damodar at Panchet Dam (which is around 6 km from the project site in
		Study Area:			
		Water Body	Distance	Direction	
	Damodar River	2.8 km	NW direction w.r.t. the Project Site		

S. No.	Particulars	Details	Remarks
			NW direction) is 129.54 m (425 ft.) whereas the Above Mean Sea Level of the Project site is 160 m.
viii.	Existence of ESZ/ ESA/ national park/ wildlife sanctuary/ biosphere reserve/ tiger reserve/ elephant reserve etc. if any within the study area	Not found in the study area.	



Unit configuration and capacity

Sl. No.	Name of the Units	Units as per NOC from WBPCB	Units as per EC dated 27.08.2010	Units as per EC dated 04.01.2023	Units under Operation	Units under Implementation / To be Implemented	Proposed Units	Overall Project Scenario
1	Sinter Plant	-	-	-	-	-	1X0.5 MTPA (1x70 M ²) Sinter	1X0.5 MTPA (1x70 M ²) Sinter
2	Mini Blast Furnace (MBF) Plant	-	-	-	-	-	1X500 M ³ (5,00,000 TPA Liq. Metal)	1X500 M ³ (5,00,000 TPA Liq. Metal)
3	Sponge Iron Plant	-	4x100 TPD DRI Kilns (1,20,000 TPA Sponge Iron) (Dropped)	1x400 TPD DRI Kiln (1,32,000 TPA Sponge Iron)	-	1x400 TPD DRI Kiln (1,32,000 TPA Sponge Iron)	3x650 TPD DRI Kilns (6,43,500 TPA Sponge Iron)	1x400 TPD + 3x650 TPD DRI Kilns (7,75,500 TPA Sponge Iron)
4	Induction Furnaces with matching LRF, CCM & Slab Caster	1x3 T + 1x6 T (28,800 TPA Billets) (As per NOC from WBPCB)	2x15 T (90,000 TPA Billets) (1x15 T Installed & 1x15 T dropped)	3x15 T + 2x10 T (2,10,500 TPA Billets) (Existing 1x3 T + 1x6 T IFs shall be replaced by 2x10 T IFs)	(1x3 T + 1x6 T) # + (1x15 T) (as per EC 2010) + (1x15 T) (as per EC 2023) (28,800 TPA + 45,000 TPA + 48,667 TPA = 1,22,467 TPA Billets)	2x15 T + 2x10 T (1,61,833 TPA Billets) (Existing 1x3 T + 1x6 T IFs shall be replaced by 2x10 T IFs)	6x25 T (New) (6,17,400 TPA Billets) along with 1x15 TPH Slag Crusher unit And Enhancement (through optimization in operation) the production capacity of 4x15 T + 2X10 T (as per EC 2010 & 2023) from 2,55,500 TPA to 3,29,280 TPA Billets (Total 9,46,680	6x25 T (New) (6,17,400 TPA Billets) along with 1x15 TPH Slag Crusher unit And Enhancement (through optimization in operation) the production capacity of 4x15 T + 2X10 T (as per EC 2010 & 2023) from 2,55,500 TPA to 3,29,280 TPA Billets

Sl. No.	Name of the Units	Units as per NOC from WBPCB	Units as per EC dated 27.08.2010	Units as per EC dated 04.01.2023	Units under Operation	Units under Implementation / To be Implemented	Proposed Units	Overall Project Scenario
							TPA Billets) with matching LRF, CCM & Slab Caster)	(Total 9,46,680 TPA Billets) with matching LRF, CCM & Slab Caster)
5	Electric Arc Furnaces with matching LRF/15 T capacity VOD (@24 Heats, 330 Working Days) & CCM	-	-	-	-	-	1x25 T (1,94,000 TPA Billets) with matching LRF/15 T capacity VOD	1x25 T (1,94,000 TPA Billets) with matching LRF/15 T capacity VOD
6	Ferro Alloy plant and 20 TPH Chrome Ore Briquetting Plant	-	-	-	-	-	3x12 MVA (65,600 TPA Si-Mn or 88,800 TPA Fe-Mn or 30,400 TPA Fe-Si or 67,200 Low Carbon Fe-Cr)	3x12 MVA (65,600 TPA Si-Mn or 88,800 TPA Fe-Mn or 30,400 TPA Fe-Si or 67,200 Low Carbon Fe-Cr)
7	Rolling Mill	-	-	1,92,000 TPA Structural Steels (Angles, Channels, Joist, TMT Bars, Wire Rod, Strips & Pipes etc.) with 1x15 TPH Reheating Furnace	24,000 TPA Structural Steels (Strips & Pipes etc.)	1,68,000 TPA Structural Steels (Angles, Channels, Joist, TMT Bars, Wire Rod, Strips & Pipes etc.) with 1x15 TPH Reheating Furnace	1x0.3 MTPA TMT bars, Wire Rod, Structural etc. with 1x25 TPH Reheating Furnace (Optional)	0.192 MTPA + 1X0.3 MTPA Structural Steels (Angles, Channels, Joist, TMT Bars, Wire Rod, Strips & Pipes etc.) with 1x15

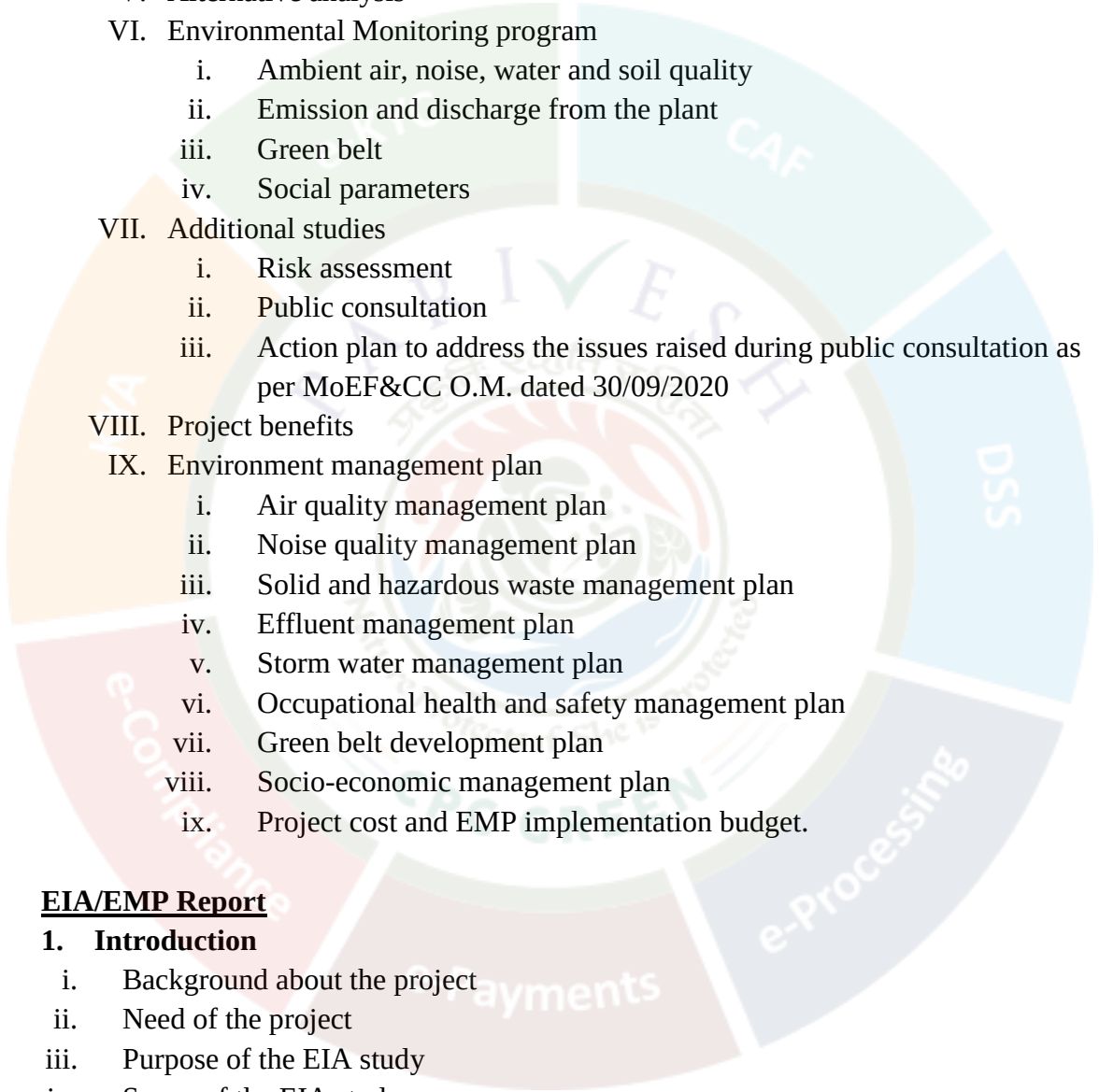
Sl. No.	Name of the Units	Units as per NOC from WBPCB	Units as per EC dated 27.08.2010	Units as per EC dated 04.01.2023	Units under Operation	Units under Implementation / To be Implemented	Proposed Units	Overall Project Scenario
								TPH + 1x25 TPH (Optional) Reheating Furnaces
8	Lime Plant	-	-	-	-	-	1x250 TPD Quicklime	1x250 TPD Quicklime
9	Oxygen Plant	-	-	-	-	-	1x225 TPD Liquid Oxygen	1x225 TPD Liquid Oxygen
10	Ductile Iron Pipe (DIP) Plant	-	-	-	-	-	1X0.5 MTPA Ductile Iron Pipe	1X0.5 MTPA Ductile Iron Pipe
11	Galvanizing Unit	-	-	-	-	-	60,000 TPA	60,000 TPA
12	Producer Gas Plant (PGP)	-	-	-	-	-	4x4000 Nm ³ /Hr (16,000 Nm ³ /Hr) Producer Gas	4x4000 Nm ³ /Hr (16,000 Nm ³ /Hr) Producer Gas
13	Captive Power Plant	-	12 MW CPP (8 MW WHRB + 4 MW AFBC) (Dropped)	20 MW CPP (10 MW WHRB + 10 MW AFBC)	10 MW CPP (WHRB)	10 MW CPP (AFBC)	100 MW CPP (70 MW WHRB + 30 MW AFBC/CFBC)	120 MW CPP (80 MW WHRB + 10 MW AFBC + 30 MW AFBC/CFBC)

Standard TOR**Standard ToR in line with Appendix III of the EIA, 2006.**
applicable to Proposals Under Industry-1 Sector**Preliminary requirements:**

- i. EIA/EMP report cover page shall consists of project title with location, applicable schedule of the EIA Notification, 2006, ToR letter No. with date, study period along with EIA consultant & laboratory details with QCI/NABET/NABL accreditation certificate detail.
- ii. Besides, following points shall be compiled as per QCI/NABET norms:
 - a. Disclaimer by the EIA consultant.
 - b. Declaration by the Functional Area Experts contributed to the EIA study and declaration by the head of the accredited consultant organization/authorized person.
 - c. Undertaking by the project proponent owning the contents (information and data) of the EIA/EMP report.
 - d. Undertaking by the EIA consultant regarding compliance of ToR issued by MoEF&CC.
 - e. Consultant shall submit the Plagiarism Certificate for the EIA/EMP Report.

Structure of EIA/EMP report**Executive Summary**

- i. Table of Contents of the EIA report including list of tables/figures/annexures/abbreviations/symbols/notations.
- ii. Point wise compliance to the ToR issued by MoEF&CC.
- iii. Executive Summary
 - I. Introduction
 - i. Name of the project along with applicable schedule and category as per EIA, 2006.
 - ii. Location and accessibility
 - II. Project description
 - i. Resource requirements (Land; water; fuel; manpower)
 - ii. Operational activity
 - iii. Key pollution concerns
 - III. Baseline Environment Studies
 - i. Ambient air quality
 - ii. Ambient Noise quality
 - iii. Traffic study
 - iv. Surface water quality
 - v. Ground water quality
 - vi. Soil quality
 - vii. Biological Environment
 - viii. Land use

- 
- ix. Socio-economic environment
 - IV. Anticipated impacts
 - i. Impact on ambient air quality
 - ii. Impact on ambient noise quality
 - iii. Impact on road and traffic
 - iv. Impact on surface water resource and quality
 - v. Impact on ground water resource and quality
 - vi. Impact on terrestrial and aquatic habitat
 - vii. Impact on socio-economic environment
 - V. Alternative analysis
 - VI. Environmental Monitoring program
 - i. Ambient air, noise, water and soil quality
 - ii. Emission and discharge from the plant
 - iii. Green belt
 - iv. Social parameters
 - VII. Additional studies
 - i. Risk assessment
 - ii. Public consultation
 - iii. Action plan to address the issues raised during public consultation as per MoEF&CC O.M. dated 30/09/2020
 - VIII. Project benefits
 - IX. Environment management plan
 - i. Air quality management plan
 - ii. Noise quality management plan
 - iii. Solid and hazardous waste management plan
 - iv. Effluent management plan
 - v. Storm water management plan
 - vi. Occupational health and safety management plan
 - vii. Green belt development plan
 - viii. Socio-economic management plan
 - ix. Project cost and EMP implementation budget.

EIA/EMP Report

1. Introduction

- i. Background about the project
- ii. Need of the project
- iii. Purpose of the EIA study
- iv. Scope of the EIA study

2. Project description

A. Site Details

- i. Location of the project site covering village, Taluka/Tehsil, District and State.
- ii. Site accessibility
- iii. A digital toposheet in pdf or shape file compatible to google earth of the study area of radius of 10km and site location preferably on 1:50,000 scale. (including all eco-sensitive areas and environmentally sensitive places).

- iv. Latest High-resolution satellite image data having 1 m - 5 m spatial resolution like quickbird, Ikonos, IRS P-6 pan sharpened etc., along with delineation of plant boundary co-ordinates. Area must include at least 100 m all around the project location.
- v. Environment settings of the site and its surrounding along with map.
- vi. A list of major industries with name, products and distance from plant site within study area (10km radius) and the location of the industries shall be depicted in the study area map.
- vii. In case if the project site is in vicinity of the water body, 50 meters from the edge of the water body towards the site shall be treated as no development/construction zone. If it's near the wetland, Guidelines for implementing Wetlands (Conservation and Management) Rules, 2017 may be followed.
- viii. In case if the project site is in vicinity of the river, the industry shall not be located within the river flood plain corresponding to one in 25 years flood, as certified by concerned District Magistrate/Executive Engineer from State Water Resources Department (or) any other officer authorized by the State Government for this purpose as per the provisions contained in the MoEF&CC Office Memorandum dated 14/02/2022.
- ix. In case of canal/ nala/ seasonal drain and any other water body passing through project site, the PP shall submit the suitable steps /conservation plan/mitigation measures along with contouring, Run -off calculations, disposal etc. A robust and full proof Drainage Conservation scheme to protect the natural drainage/water bodies and its flow parameters; along with Soil conservation scheme and multiple Erosion control measures shall be provided in the report.
- x. Type of land, land use of the project site needs to be submitted.
- xi. Status of acquisition of land. If acquisition is not complete, stage of the acquisition process as per the MoEF&CC O.M. dated 7/10/2014 shall be furnished.
- xii. Project proponent shall prepare Engineering layout plan showing all internal roads minimum 6 m width and 9 m turning radius for smooth traffic flow inside including fire tender as per NBC. Road network shall connect all service areas in layout. This drawing shall include area statement showing plot area, area under roads, parking, green belt with calculations and % with respect to plot area of project site and proper indexing. If located within an Industrial area/Estate/Complex, layout of Industrial Area indicating location of unit within the Industrial area/Estate.
- xiii. Project proponent shall submit contour map of project site along with drainage disposal system with calculations and drawings supported with proper indexing including Rain Water Harvesting details with calculations mentioning about GW recharge along with relevant drawing.
- xiv. A detailed report covering all aspects of Fire Safety Management and Fire Emergency Plan shall be submitted.
- xv. Details of drone survey for the site, needs to be included in report and presented before the EAC during appraisal of the project.

B. Forest and wildlife related issues (if applicable):

- i. Status of Forest Clearance for the use of forest land shall be submitted.
- ii. Copy of application submitted for clearance under the Wildlife (Protection) Act, 1972, to the Standing Committee of the National Board for Wildlife if the project site located within notified Eco-Sensitive Zone, 10 km radius of national park/sanctuary wherein final ESZ notification is not in place as per MoEF&CC Office Memorandum dated 8/8/2019.
- iii. The projects to be located within 10 km of the National Parks, Sanctuaries, Biosphere Reserves, Migratory Corridors of Wild Animals, Eco-sensitive Zone and Eco-sensitive areas, the project proponent shall submit the map duly authenticated by Divisional Forest Officer showing the distance between the project site and the said areas.
- iv. Wildlife Conservation Plan duly authenticated by the Competent Authority of the State Government for conservation of Schedule I fauna along with budget and action plan, if any exists in the study area.

C. Salient features of the project

- i. Products with capacities in **Tons per Annum** for the proposed project.
- ii. If expansion project, status of implementation of existing project, details of existing/proposed products with production capacities in Tons per Annum.
- iii. Site preparatory activities.
- iv. List of raw materials required and their source along with mode of transportation.
- v. Other than raw materials, other chemicals and materials required with quantities and storage capacities.
- vi. Manufacturing process details along with process flow diagram of proposed units.
- vii. Consolidated materials and energy balance for the project.
- viii. Total requirement of surface/ ground water and power with their respective sources, status of approval.
- ix. Water balance diagram
- x. Details of Emission, effluents, hazardous waste generation and mode of disposal during construction as well as operation phase.
- xi. Man-power requirement.
- xii. Cost of project and scheduled time of completion.
- xiii. In case of expansion projects, project proponent shall submit structural stability certificate showing whether existing structure withstand for proposed expansion activity.
- xiv. Brief on present status of compliance (Expansion/modernization proposals)
 - a. Cumulative Environment Impact Assessment for the existing as well as the proposed expansion/modernization shall be carried out.
 - b. In case of ground water drawl for the existing unit, action plan for phasing out of ground water abstraction in next two years except for domestic purposes and shall switch over to 100 % use of surface water from nearby source.
 - c. Copy of all the Environment Clearance(s) including Amendments/validity of extension/transfer of EC, there to obtained for the project from MoEF&CC/SEIAA shall be attached as Annexures. A Certified Compliance Report (CCR) of the Integrated Regional Office of the Ministry of Environment, Forest and Climate Change/ or concerned

authority as per OM No. IA3-22/10/2022-IA.III [E 1772581], dated 8th June, 2022 on the status of compliance of conditions stipulated in all the existing environment clearances including amendments shall be provided. A Certified Compliance Report (CCR) issued by the concerned Authority shall be valid for a period of one year from the date of inspection.

- d. In case the existing project has not obtained Environment Clearance, reasons for not taking EC under the provisions of the EIA Notification 1994 and/or EIA Notification 2006 shall be provided. A proper justification needs to be submitted along with documentary proof. Copies of Consent to Establish/No Objection Certificate and Consent to Operate (in case of units operating prior to EIA Notification 1994 or 2006, CTE and CTO of FY 2005-2006) obtained from the SPCB shall be submitted. Further, compliance report to the conditions of CTO from the Regional Office of the SPCB shall be submitted, as per OM No. IA3-22/10/2022-IA.III [E 1772581], dated 8th June, 2022. CCR on CTO conditions issued by the concerned SPCBs/PCCs shall be valid for a period of one year from the date of inspection of the project.

3. Description of the Environment

- Study period
- Approach and methodology for data collection as furnished below.

Attributes	Sampling		Remarks
	Network	Frequency	
A. Air Environment			
Micro-Meteorological - Wind speed (Hourly) - Wind direction - Dry bulb temperature - Wet bulb temperature - Relative humidity - Rainfall - Solar radiation - Cloud cover - Environmental Lapse Rate	Minimum 1 site in the project impact area	1 hourly continuous	- IS 5182 Part 1-20 - Site specific primary data is essential - Secondary data from IMD, New Delhi - CPCB guidelines to be considered.
Pollutants PM_{2.5}	At least 8-12 locations	As per National Ambient Air Quality Standards, CPCB Notification.	- Sampling as per CPCB guidelines - Collection of AAQ data (except in monsoon season) - Locations of various stations
PM₁₀			
SO₂			
NO_x			
CO			
HC			
Other parameters relevant to the project			

Attributes	Sampling		Remarks
	Network	Frequency	
and topography of the area			for different parameters should be related to the characteristic properties of the parameters. - The monitoring stations shall be based on the NAAQM standards as per GSR 826(E) dated 16/11/2009 and take into account the predominant wind direction, population zone and sensitive receptors including reserved forests, - Raw data of all AAQ measurement for 12 weeks of all stations as per frequency given in the NAAQM Notification of 16/11/2009 along with min., max., average and 98% values for each of the AAQ parameters from data of all AAQ stations should be provided as an

Attributes	Sampling		Remarks
	Network	Frequency	
			annexure to the EIA Report.
B. Noise			
Hourly equivalent noise levels	At least 8-12 locations	As per CPCB norms	-
C. Water			
Parameters for water quality - pH, temp, turbidity, magnesium hardness, total alkalinity, chloride, sulphate, nitrate, fluoride, sodium, potassium, salinity - Total nitrogen, total phosphorus, DO, BOD, COD, Phenol - Heavy metals - Total coliforms, faecal coliforms - Phyto-plankton - Zoo-plankton - Microalgae/microalgal bloom	Samples for water quality should be collected and analyzed as per: - IS: 2488 (Part 1-5) methods for sampling and testing of Industrial effluents - Standard methods for examination of water and wastewater analysis published by American Public Health Association.		
For River Bodies - Total Carbon - pH - Dissolved Oxygen - Biological Oxygen Demand - Free NH4 - Boron - Sodium Absorption Ratio - Electrical Conductivity - TDS	Surface water quality of the nearest River (60m upstream and downstream) and other surface water bodies	- Yield of water sources to be measured during critical season - Standard methodology for collection of surface water (BIS standards)	
For Ground Water	Ground water monitoring data should be collected at minimum of 8 locations (from existing wells /tube wells/existing current records) from the study area and shall be included.		

Attributes	Sampling		Remarks
	Network	Frequency	
D. Traffic Study			
- Type of vehicles - Frequency of vehicles for transportation of materials - Additional traffic due to proposed project - Parking arrangement	-		
E. Land Environment			
Soil - Particle size distribution - Texture - pH - Electrical conductivity - Cation exchange capacity - Alkali metals - Sodium Absorption Ratio (SAR) - Permeability - Water holding capacity - Porosity	Soil samples be collected as per BIS specifications		
Land use/Landscape - Location code - Total project area - Topography - Drainage (natural) - Cultivated, forest, plantations, water bodies, roads and settlements	-		
E. Biological Environment			
Aquatic - Primary productivity - Aquatic weeds - Enumeration of phyto plankton, zoo plankton and benthos - Fisheries - Diversity indices - Trophic levels	Detailed description of flora and fauna (terrestrial and aquatic) existing in the study area shall be given with special reference to rare, endemic and endangered species. Indicator species which indicate ecological and environment degradation should be identified and included to clearly state whether the proposed project would result in to any adverse effect on any species.		

Attributes	Sampling		Remarks
	Network	Frequency	
- Rare and endangered species - Marine Parks/ Sanctuaries/ closed areas /coastal regulation zone (CRZ) Terrestrial - Vegetation-species list, economic importance, forest produce, medicinal value - Importance value index (IVI) of trees - Fauna - Avi fauna - Rare and endangered species - Sanctuaries / National park / Biosphere reserve - Migratory routes			- Samples to collect from upstream and downstream of discharge point, nearby tributaries at downstream, and also from dug wells close to activity site. - For forest studies, direction of wind should be considered while selecting forests. - Secondary data to collect from Government offices, NGOs, published literature.
F. Socio-economic			
- Demographic structure - Infrastructure resource base - Economic resource base - Health status: Morbidity pattern - Cultural and aesthetic attributes - Education			- Socio-economic survey is based on proportionate, stratified and random sampling method. - Primary data collection through questionnaire - Secondary data from census records, statistical hard books, topo sheets, health records and relevant official records available with Govt. agencies

iii. Interpretation of each environment attribute shall be enumerated and summarized as given below:

- Ambient air quality
- Ambient Noise quality
- Surface water quality
- Ground water quality
- Soil quality
- Biological Environment

- Land use
- Socio-economic environment

4. Anticipated Environment Impacts and mitigation measures (In case of expansion, cumulative impact assessment shall be carried out)

- i. Identification of potential impacts in the form of a **matrix** for the construction and operation phase for all the environment components

Activity	Environment	Ecological	Socio-economic
Construction phase			
Operation phase			

- ii. Impact on ambient air quality (Sources; Embedded control measures; Assessment; Mitigation measures; Residual impact)

a. Construction phase

b. Operation phase

- Details of stack emissions from the existing as well as proposed activity.
- Assessment of ground level concentration of pollutants from the stack emission based on AQIP Modelling The air quality contours shall be plotted on a location map showing the location of project site, habitation nearby, sensitive receptors, if any along with wind rose map for respective period
- Impact on ground level concentration, under normal, abnormal and emergency conditions. Measures to handle emergency situations in the event of uncontrolled release of emissions.

- iii. Impact on ambient noise quality (Sources; Embedded control measures; Assessment; Mitigation measures; Residual impact)

a. Construction phase

b. Operation phase

- iv. Impact on traffic (Sources; Embedded control measures; Assessment; Mitigation measures; Residual impact)

a. Construction phase

b. Operation phase

- v. Impact on soil quality (Sources; Embedded control measures; Assessment; Mitigation measures; Residual impact)

a. Construction phase

b. Operation phase

- vi. Impact on land use (Sources; Embedded control measures; Assessment; Mitigation measures; Residual impact)

a. Construction phase

b. Operation phase

- vii. Impact on surface water resource and quality (Sources; Embedded control measures; Assessment; Mitigation measures; Residual impact)

a. Construction phase

b. Operation phase

- viii. Impact on ground water resource and quality (Sources; Embedded control measures; Assessment; Mitigation measures; Residual impact)
 - a. Construction phase
 - b. Operation phase
- ix. Impact on terrestrial and aquatic habitat (Sources; Embedded control measures; Assessment; Mitigation measures; Residual impact)
 - a. Construction phase
 - b. Operation phase
- x. Impact on socio-economic environment (Sources; Embedded control measures; Assessment; Mitigation measures; Residual impact)
 - a. Construction phase
 - b. Operation phase
- xi. Impact on occupational health and safety (Sources; Embedded control measures; Assessment; Mitigation measures; Residual impact)
 - a. Construction phase
 - b. Operation phase

5. Analysis of Alternatives (Technology & Site)

- i. No project scenario
- ii. Site alternative
- iii. Technical and social concerns
- iv. Conclusion

6. Environmental Monitoring Program

- i. Details of the Environment Management Cell
- ii. Performance monitoring schedule for all pollution control devices shall be furnished.
- iii. Corporate Environment Policy
 - a. Does the company have a well laid down Environment Policy approved by its Board of Directors? If so, it may be detailed in the EIA report.
 - b. Does the Environment Policy prescribe for standard operating process / procedures to bring into focus any infringement / deviation / violation of the environment or forest norms / conditions? If so, it may be detailed in the EIA.
 - c. What is the hierarchical system or Administrative order of the company to deal with the environment issues and for ensuring compliance with the environment clearance conditions? Details of this system may be given.
 - d. Does the company have system of reporting of non compliances / violations of environment norms to the Board of Directors of the company and / or shareholders or stakeholders at large? This reporting mechanism shall be detailed in the EIA report
- iv. Action plan for **post-project environment monitoring matrix:**

Activity	Aspect	Monitoring Parameter	Location	Frequency	Responsibility
Construction phase					
Operation phase					

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7. Additional Studies

- i. Project proponent shall submit a study report on Decarbonisation program, which would essentially consist of company's carbon emissions, carbon budgeting/ balancing, carbon sequestration activities and carbon capture, use and storage after offsetting strategies. Further, the report shall also contain time bound action plan to reduce its carbon intensity of its operations and supply chains, energy transition pathway from fossil fuels to Renewable energy etc. All these activities/ assessments should be measurable and monitorable with defined time frames.
- ii. Details of adoption/ implementation status/plan to achieve the goal of Glasgow COP26 Climate Submit with regard to enhance the non-fossil energy, use of renewable energy, minimization of net carbon emission and carbon intensity with long-term target of "net Zero" emission.
- iii. Implementation status/measures adopted for avoiding the generation of single used plastic waste.
- iv. In cases the project is located in Critically and Severely Polluted Areas, additional mitigation measures adopted and detailed action plan to be submitted in the EIA/EMP Report as per MoEF&CC O.M. No. 22-23/2028-IA.III dated 31/10/2019 and MoEF&CC O.M. No. 22-23/2028-IA.III dated 5/07/2022 has to be submitted.
- v. Public consultation details (Entire proceedings as separate annexure along with authenticated English Translation of Public Consultation proceedings).
- vi. As part of Corporate Environment Responsibility (CER) activity, company shall adopt nearby villages based on the socio-economic survey and undertake community developmental activities in consultation with the village Panchayat and the District Administration. In this regard, time bound action plan as per the MoEF&CC Office Memorandum dated 30/09/2020 shall be submitted.
- vii. Summary of issues raised during public consultation along with action plan to address the same as per MoEF&CC O.M. dated 30/09/2020

S No	Physical activity and action plan		Year of implementation (Budget in INR)			Total Expenditure (Rs. in Crores)
	Name of the Activity	Physical Targets	1 st	2 nd	3 rd	

viii. Risk assessment

- Methodology
- Hazard identification
- Frequency analysis
- Consequence analysis
- Risk assessment outcome

ix. Emergency response and preparedness plan

8. Project Benefits

- i. Environment benefits
- ii. Social infrastructure

- iii. Employment and business opportunity
- iv. Other tangible benefits

9. Environment Cost Benefit Analysis

- i. Net present value
- ii. Internal rate of return
- iii. Benefit cost ratio
- iv. Cost effectiveness analysis

10. Environment Management Plan (Construction and Operation phase)

- i. Air quality management plan
- ii. Noise quality management plan
- iii. Action plan for hazardous waste management
- iv. Action plan for solid waste management
- v. Action plan for e-waste management.
- vi. Action plan for plastic waste management.
- vii. Action plan for construction and demolition waste management.
- viii. Effluent management plan
- ix. Storm water management plan
- x. Rain water harvesting plan
- xi. Plan for maximum usage of waste water/treated water in the Unit
- xii. Occupational health and safety management plan
- xiii. Green belt development plan: An action plan for Green Belt development consisting of 3 tiers of plantations of native species all along the periphery of the project of adequate width shall be raised in 33% of total area with a tree density shall not less than 2500 per ha within a time frame of one year shall be submitted. Survival rate of green belt shall be monitored on periodic basis to ensure that survival rate not be less than 80 %.
- xiv. Socio-economic management plan
- xv. Wildlife conservation plan (In case of presence of schedule I species)
- xvi. Total capital cost and recurring cost/annum for environment pollution control measures shall be included.

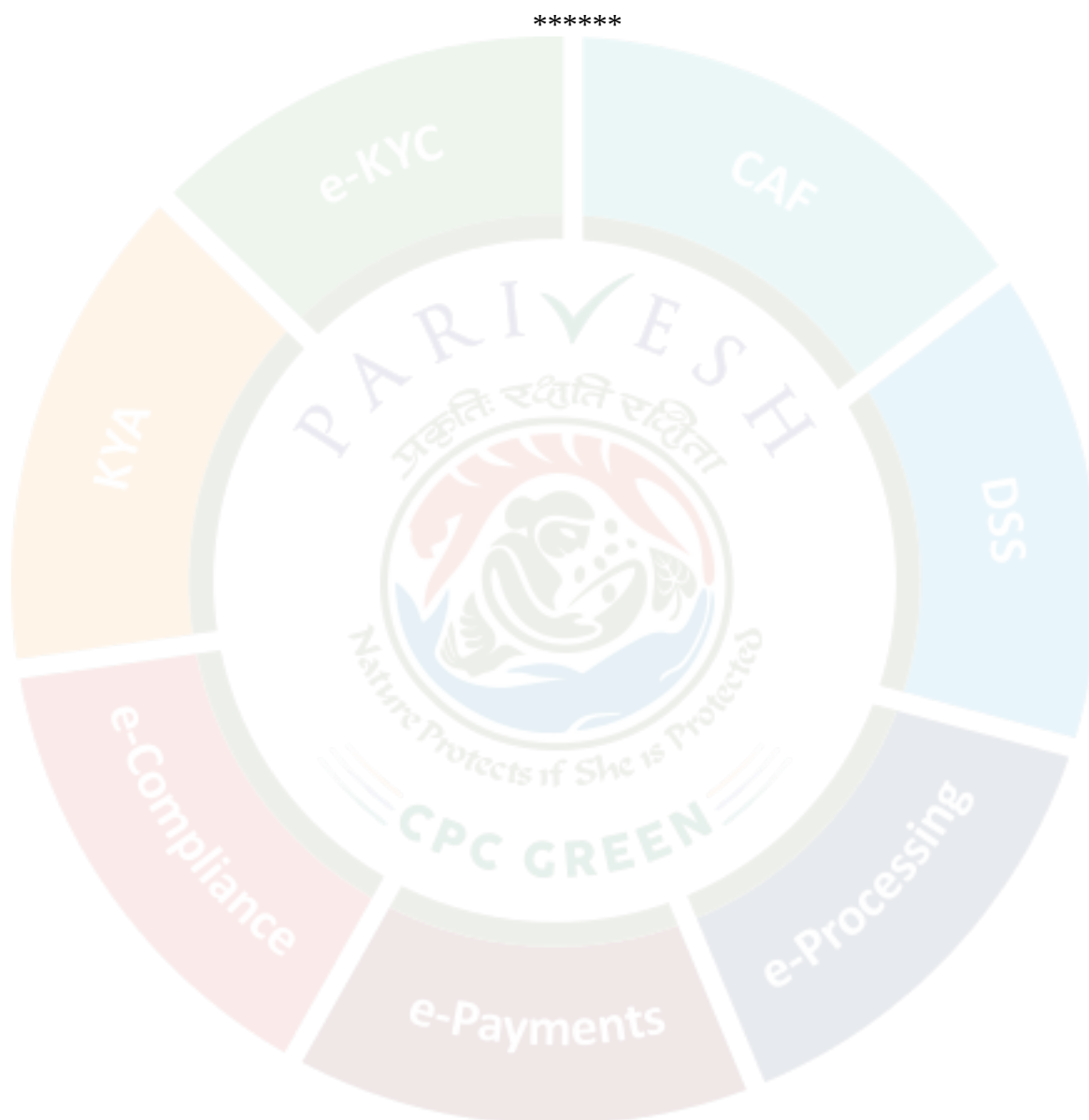
11. Conclusion of the EIA study

12. In addition to the above, any litigation pending against the project and/or any direction/order passed by any Court of Law against the project, if so, details thereof shall also be included. Has the unit received any notice under the Section 5 of Environment (Protection) Act, 1986 or relevant Sections of Air and Water Acts? If so, details thereof and compliance/ATR to the notice(s) and present status of the case.

Additional ToRs**Standard ToRs FOR INTEGRATED STEEL PLANT [3(a)]**

1. Iron ore/coal linkage documents along with the status of environment clearance of iron ore and coal mines.
2. Quantum of production of coal and iron ore from coal & iron ore mines and the projects they cater to. Mode of transportation to the plant and its impact.
3. For Large ISPs, a 3-D view i.e. DEM (Digital Elevation Model) for the area in 10 km radius from the proposal site. MRL details of project site and RL of nearby sources of water shall be indicated.
4. Recent land-use map based on satellite imagery. High-resolution satellite image data having 1m-5m spatial resolution like quickbird, Ikonos, IRS P-6 pan sharpened etc. for the 10 Km radius area from proposed site. The same shall be used for land used/land-cover mapping of the area.
5. PM (PM₁₀ and PM_{2.5}) present in the ambient air must be analysed for source analysis – natural dust/RSPM generated from plant operations (trace elements) of PM₁₀ to be carried over.
6. All stock piles will have to be on top of a stable liner to avoid leaching of materials to ground water.
7. Plan for the implementation of the recommendations made for the steel plants in the CREP guidelines.
8. Plan for slag utilization
9. Plan for utilization of energy in off gases (coke oven, blast furnace)
10. System of coke quenching adopted with justification.
11. Trace metals Mercury, arsenic and fluoride emissions in the raw material.
12. Trace metals in waste material specially in slag.
13. Trace metals in water
14. Details of proposed layout clearly demarcating various units within the plant.
15. Complete process flow diagram describing each unit, its processes and operations, along with material and energy inputs and outputs (material and energy balance).
16. Details on design and manufacturing process for all the units.
17. Details on environmentally sound technologies for recycling of hazardous materials, as per CPCB Guidelines, may be mentioned in case of handling scrap and other recycled materials.
18. Details on requirement of energy and water along with its source and authorization from the concerned department. Location of water intake and outfall points (with coordinates).
19. Details on toxic metal content in the waste material and its composition and end use (particularly of slag).
20. Details on toxic content (TCLP), composition and end use of slag.
21. Fourth Hole fume extraction system shall be provided for submerged Arc Furnace (SAF). Waste heat recovery (WHR) system shall be installed to recover the sensible heat from flue gases of electric arc furnace (EAF).

22. Emission/effluent norms as per G.S.R 894 (E) dated 4/12/2019 [EPA Rules 1986].
23. Action plan for the stock piles with impervious floor, provision of garland drains and catch pits to trap run off material shall be submitted.
24. Action plan to limit the particulate matter emission from all the stacks below 30 mg/Nm³ shall be furnished.
25. Action plan for 100 % solid waste utilization shall be submitted.
26. PP shall explore the possibility of plastic waste utilization in the Plant/Unit process.



Signature Not Verified

Digitally Signed by : Dr R B Lal
Member Secretary, MoEFCC (EC)

Date: 10/06/2024

WEST BENGAL POLLUTION CONTROL BOARD
ASANSOL SUB REGIONAL OFFICE
60, G.T. Road, Chanty Mansion, 2nd Floor
Asansol -713301. Phone & Fax: 222 0007

Memo no. 1334 /I-WPBA-NOC (816)/05.

Date: 15/12/2006.

From : Assistant Environmental Engineer,
Asansol Sub Regional Office.

To
M/s. Nutan Iron & Steel (p) Ltd.,
Hanuman Charai, Near Bus Stand,
Po. & Ps. Barakar, Dt. Burdwan.

Sub. : Validity extension of Consent to Establish (NOC) SL No. NO31961 dated 09/11/05 of
M/s Nutan Iron & Steel (p) Ltd., Hanuman Charai, Near Bus Stand, Po. & Ps. Barakar, Dt.
Burdwan.

Ref : Your letter No. NIL, Dated. 11.12.2006.

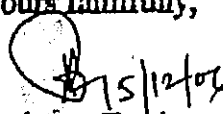
Sir,

With reference to the above subject and your application dated 11.12.06 this is to inform you
that, the validity period of the "Consent to Establish" (NOC) issued to you vide memo no.1211-
WPBA-NOC (816)/05 dated 09.11.2005 is hereby extended upto 31.03.07.

No further extension will be allowed. All special conditions as laid down in the aforementioned
NOC shall remain unchanged.

This is to be treated as an annexure to the NOC SL No. NO31961 issued vide memo no. 1211-
WPBA-NOC (816)/05 dated 09.11.05.

Yours faithfully,


Assistant Environmental Engineer,
Asansol Sub Regional Office.

NOC N071687

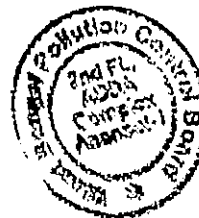
WEST BENGAL POLLUTION CONTROL BOARD

Paribesh Bhawan
10A, Block-LA, Sector-III
Bhikhannagar, Kolkata-700 098

Memo No. 498 -WPBA/NOC(816)/05

Dated 03/5/2010

From
Member Secretary,
West Bengal Pollution Control Board



To: Sri Dinesh Adukia. (Director).
M/s. AIC Iron Industries (P) Ltd.
25, Ganesh Chandra Avenue, 95th Floor, Kolkata-700013.

WEST BENGAL

Sub: Consent to Establish (NOC) from Environmental Point of View
Ref: Your letter No. N11 Dated 09/02/10

Dear Sirs,

expansion

In response to the application for Consent to Establish (NOC) for proposed Unit of M/s
AIC Iron Industries Pvt. Ltd.
for manufacturing/storage/installation of M.S. Iron Ingot (Installed capacity-
1600 MT/month) manufacturing.

Plot nos. 505, 506, 520, 523, 524, 525, J.L. No. 83, Mouza-Uttarah,
at Sarbari Gram Panchayet, P.S. Neturia, Dist-Purulia.
this is to inform you that this Board hereby grants the Consent to Establish (NOC) from the environmental point
of the above subject to the following conditions and special conditions annexed.

1. The quality of sewage and trade effluent to be discharged from your factory shall satisfy the permissible limits as prescribed in IS : 2490 (Pt. I) of 1974, and/or its subsequent amendment and Environment (Protection) Rules 1986.
2. Suitable measures to treat your effluent shall be adopted by you in order to reduce the pollutional load so that the quality of the effluent satisfies the standards mentioned above.
3. You shall have to apply to this Board for its consent to operate and discharge of sewage and trade effluent according to the provisions of the water (Prevention & Control of Pollution) Act, 1974. No sewage or trade effluent shall be discharged by you without prior consent of this Board.
4. All emission from your factory shall conform to the standards as laid down by this Board.
5. No emission shall be permitted without prior approval of this Board and you shall apply to this Board for its consent to operate and atmospheric emission as per provision of the Air (Prevention & Control Pollution) act, 1981.
6. No industrial plant, furnace, flues, chimneys, control equipment, etc. shall be constructed/reconstructed/erected/re-erected without prior approval of this Board.

071687

You shall comply with

- (i) Water (Prevention and Control of Pollution) Cess Act, 1977, if applicable.
- (ii) Water (Prevention and Control of Pollution) Cess Act, 1978, if applicable.
- (iii) Environment (Protection) Act, 1986
- (iv) Environment (Protection) Rules, 1986
- (v) Hazardous Wastes (Management and Handling) Rules, 1989 and Amended Rules, 2000
- (vi) Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 and Amended Rules, 2000
- (vii) Manufacture, Use, Import and Storage and Hazardous Micro-Organisms, Genetically Engineered Organisms or Cell Rules, 1989
- (viii) The Public Liability Insurance Act, 1991 and Amended Act, 1992
- (ix) The Public Liability Insurance Rules, 1991 and Amended Rules 1993
- (x) Biomedical Wastes (Management & Handling) Rules, 1998 and Amended Rules 2000 if applicable.
- (xi) Recycled Plastics Manufacture and Usage Rules 1999, if applicable and
- (xii) Ozone Depleting Substances (Regulation & Control) Rules, 2000, if applicable

- 8 You will have to abide by any other stipulations as may be prescribed by any authority/local bodies/Government Departments etc.

SPECIAL CONDITION:

See Annexure enclosed.

- 1) Total fixed capital investment including land, building, ~~etc~~ Plant & Machinery-Rs.2,40,00,000/- (Rupees two hundred & forty lakhs).

Any violation of the aforesaid conditions shall entail cancellation of this Consent to Establish (NOC)

Yours faithfully,

[Signature] 03/05/10
Member Secretary,
West Bengal Pollution Control Board

Memo No.

Dated

Copy forwarded for information to :

1. Chief Inspector of Factories, Government of West Bengal, N. S. Building, Kolkata-700 001
2. Director of Industries/Director of Cottage & Small Scale Industries, Government of West Bengal, N. S. Building, Kolkata-700 001
3. Guard file, West Bengal Pollution Control Board.
4. Environmental Engineer, VII/Alipur R.O./Howrah R.O./Hooghly R.O./B.R.O./D.R.O./Haldia R.O./S.R.O./Malda R.O./Asansol Sub-R.O./WBPC Board

Himalaya Bhawan
Delhi Road, Dankuni
Dist. Hooghly

Vill, Panpur
Kalyani Expressway
P.O. Narayanpur
Dist. 24 Pgs. (N)

Sahid Khudiram Sarani
City Centre, Durgapur-16
Dist. Burdwan

7, Haradeb Bhattacharjee
Lane, P.S.-Shibpur
Howrah-711102

Paribesh Bhawan
10A, LA-Block, Sector-III
Bidhannagar
Kolkata-700 098

Block-05 at 40
Flats Complex
Adjacent to Priyambada
Housing Estate
P.O. : Khanjanchak,
P.S. Durgachak
Haldia-721802
Dist. : Purba Medinipur

Paribahan Nagar
Matigara, Siliguri
Dist-Darjeeling

10, Camac Street
2nd Floor
Kolkata-700 017

Satya Chowdhury
Indoor Stadium
Balurchar Bandh Road
Malda-732101

Asansol Sub-Regional Office
Ghanty Mansion (2nd Floor)
60, G.T. Road
Asansol-713 301

[Signature]
Member Secretary,
West Bengal Pollution Control Board

Annexure-I
Special Condition

Annexure to NOC SL. No. N071687.
Special Conditions issued to M/s. AIC Iron Industries (P) Ltd.
Plot nos.-505,506,520,523,524,525 J.L. no. 83, Mouza-Uttarah, P.S. Neturia, Sarbari
Gram Panchayet, Dist-Purulia.

A) Emission :-

1. Induction Furnace- 1(One) no. of capacity 6 M.T./batch

1) Stack -

i) For Induction furnace 30m from the ground level to be provided with spark arrestor, bag filter as Air Pollution Control system.

Stacks to have sampling port, platform and ladder as per the Emission Regulation part-III of CPCB.

B) Effluent :-

1) Process- Nil.

2) Cooling water to be recycled after settling.

3) Domestic- to be discharged through septic tank to panchayet drain.

C) Solid Waste :- Lumps/Slag to be used for low land filling.

D) General :-

1) Noise Control – Ambient noise level not to exceed the permissible limit.

2) The industry shall not use galvanized iron scrap as raw material.

3) Sponge iron shall be used as major raw material.

4) Good house -keeping to be maintained.

5) Tree planting – 3mtr width along the periphery of the industry.

6) No additional machinery / equipment can be installed without obtaining prior permission from the State Board.

7) Land conversation certificate to be submitted to this office within 4(four) months from the date of issue of this NOC, failing which your NOC shall be automatically cancelled.


Member Secretary
West Bengal Pollution Control Board
03/05/10

Recd on
30/9/10



F. No. J-11011/566/2008- IA II (I)
Government of India
Ministry of Environment and Forests
(I.A. Division)

Paryavaran Bhawan
CGO Complex, Lodhi Road
New Delhi – 110 003
E-mail: ms.industry-mef@nic.in
Tele/fax: 011 – 2436 3973
Dated: August 27th, 2010

To,
The Director
M/s. AIC Iron Industries Pvt. Ltd.
25, Ganesh Chandra Avenue,
4th Floor, Kolkata- 700 013,
West Bengal

E-mail: aicmetaliks@aic.in

Sub: Proposed Sponge Iron and Steel Plant along with WHRB and FBC Captive Power Plants (12 MW) (Sponge Iron 1, 20, 000 TPA, Liquid Steel: 1, 25, 000 TPA, through induction furnace and 1, 25, 000 TPA through Ladle furnace, Billets 1, 20, 000 TPA) at Village Benipur, District Purulia in West Bengal by M/s. AIC Iron Industries Pvt. Limited regarding Environmental Clearance

Sir,
This has reference to your letter no. 2008056/AIC-Purulia/534 dated 15th March, 2010 along with copies of final EIA /EMP and public hearing reports seeking environment clearance under the provisions of EIA Notification, 2006.

2. The Ministry of Environment and Forests has examined the proposal. It is noted that M/s AIC iron Industries Pvt. Limited have proposed for for the Steel Plant (sponge iron 1, 20, 000 TPA, liquid steel: 1, 25, 000 TPA, through induction furnace and 1, 25, 000 TPA through Ladle furnace, Billets 1, 20, 000 TPA) and Captive Power Plant (12 MW) at Village Benipur, District Purulia, West Bengal. Total land acquired for the proposed project is 35 acres which is a barren land with or without scrubs. No National Park, Wildlife sanctuary, Eco sensitive area is located within 10 km distance. Panchet RF, Bheti RF and Muktipur RF are located within 10 km radius. Total cost of the project is Rs. 110.00 Crores. Rs. 9.0 Crores and Rs. 0.2 Crores will be earmarked towards total capital cost and recurring cost/annum for environmental pollution control measures.

3. Following facilities will be installed.

Units	Capacity
DRI Plant	4x100 TPD, 1,20,000 TPA
Induction Furnace	2x15 T, 1,25,000 TPA
Ladle Furnace	2x15 T, 1,25,000 TPA
Continuous billet caster	1X2 strand, 1,20,000 TPA
Captive Power Plant	
WHRB (2x4 MW)	8 MW
AFBC (1x4 MW)	4 MW

4. To control the particulate emissions within 100 mg/Nm^3 , ESP will be installed to captive power plant. The waste gases from DRI kiln will be used in WHRB based CPP (2x4 MW). The gases from DRI kiln will be passed through dust settling chamber (DSC) and after burning chamber (ABC) before being used in WHRB. The fugitive dust emissions due to iron ore fines, coal fines and dolomite fines from the stock piles of raw material will be controlled by dust suppression system through water sprinkling. Primary emissions from the Induction furnace and Ladle furnace will be collected by fume extraction system and taken through ductwork to a bag filter. Suitable canopy will be provided to induction furnace to minimize the fugitive emissions. Dust extraction systems comprising of bag filters will be installed at material transfer points.

5. The make up water requirement of $4735 \text{ m}^3/\text{day}$ will be met from the River Damodar flowing at a distance of 3.5 km from the project site. The company has approached the State Government to seek permission for drawl of water. Effluent treatment plant will be installed to remove suspended solids, for neutralization of acidic water from DM plant and removal of oil and grease etc. There will be zero discharge of effluent by recirculation of treated water, for dust separation and green belt development. It is proposed to harvest rain water to minimize water consumption and recharge the ground water.

6. About 30,000 TPA of char will be generated from the sponge iron kiln which after mixing with coal fines will be used as fuel in the FBC boiler for power generation. Slag (20,000 TPA) will be used for road making within the plant premises. The kiln accretions will be used for road construction or landfill. The sludge from the gas cleaning plant will be disposed off. The flue dust generated from the ESP and other pollution control system will be utilized for brick manufacturing. The secondary flue dust from the bag filters and raw material handling / coal crushers etc. will be recycled. The fly ash (9760 TPA) will be provided to the cement manufacturing units. The company is also exploring the feasibility of setting up of fly ash brick manufacturing unit. The bottom ash (2440 TPA) will be disposed of in the landfill within the plant premises. The design of the landfill will be as per the CPCB guidelines. Greenbelt will be developed in 33% of plant area.

7. All the Integrated Steel plants are listed S.N. 3(a) under category 'A' of the Schedule of EIA Notification 2006 and appraised at the Central level. The proposal was considered by the Expert Appraisal Committee-1 (industry) in its meeting held during 26-28th July, 2010. The Committee recommended the proposal for environmental clearance subject to stipulation of specific conditions along with other environmental conditions. Public hearing/Public consultation meeting was conducted by the West Bengal Pollution Control Board on 16th July, 2009.

8. Based on the information submitted by you, presentation made by you and consultant, M/s Envirotech East Pvt. Ltd., Kolkata, the Ministry of Environment and Forests hereby accords environmental clearance to the above project under the provisions of EIA Notification dated 14th September 2006 subject to strict compliance of the following Specific and General conditions:

A. SPECIFIC CONDITIONS :

- i. On-line ambient air quality monitoring and continuous stack monitoring facilities for all the stacks shall be provided and sufficient air pollution control devices viz. Electrostatic precipitator (ESP), cyclones, bag filters etc. shall be provided to limit the emission levels below 50 mg/Nm^3 by installing energy efficient technology.

- ii. The National Ambient Air Quality Standards Issued by the Ministry vide G.S.R. No. 826(E) dated 16th November, 2009 should be followed.
- iii. Gaseous emission levels including secondary fugitive emissions from all the sources shall be controlled within the latest permissible limits issued by the Ministry vide G.S.R. 414(E) dated 30th May, 2008 and regularly monitored. Guidelines / Code of Practice issued by the CPCB should be followed.
- iv. Hot gases from DRI kiln shall be passed through Dust Settling Chamber (DSC) to remove coarse solids and After Burning Chamber (ABC) to burn CO completely and used in waste heat recovery boiler (WHRB). The gas then shall be cleaned in ESP before leaving out into the atmosphere through ID fan and stack.
- v. Efforts shall be made to make use of rain water harvested. If needed, capacity of the reservoir should be enhanced to meet the maximum water requirement. Only balance water requirement shall be met from other sources.
- vi. The water consumption shall not exceed as per the standard prescribed for the steel plants. Permission from the State Irrigation Department / Central Ground Water Board for drawl of water shall be obtained as may be applicable in this case.
- vii. Regular monitoring of influent and effluent surface, sub-surface and ground water shall be ensured and treated wastewater should meet the norms prescribed by the State Pollution Control Board or described under the Environment (Protection) Act, 1986 whichever are more stringent. Leachate study for the effluent generated and analysis shall also be regularly carried out and report submitted to the Ministry's Regional Office at Bhubaneswar SPCB & CPCB.
- viii. All the char from DRI plant shall be utilized in AFBC boiler of power plant and no char shall be disposed off anywhere else. AFBC boiler shall be installed simultaneously along with the DRI plant to ensure full utilization of char from the beginning. The slag storage yard shall be properly lined to prevent leaching into the ground water.
- ix. Proper utilization of fly ash shall be ensured as per Fly Ash Notification, 1999 and subsequent amendment in 2003 and 2010. All the fly ash should be provided to cement and brick manufacturers for further utilization and 'Memorandum of Understanding' should be submitted to the Ministry's Regional Office at Bhopal
- x. As proposed, green belt shall be developed in 33 % of the plant area. Selection of plant species shall be as per the CPCB guidelines in consultation with the DFO.
- xi. All the recommendations made in the Charter on Corporate Responsibility for Environment Protection (CREP) for the Steel Plants should be implemented.
- xii. All the commitments made to the public during the Public Hearing / Public Consultation meeting held on 16th July, 2009 shall be satisfactorily implemented and a separate budget for implementing the same shall be allocated and information submitted to the Ministry's Regional Office at Bhubaneswar.
- xiii. Risk and Disaster Management Plan along with the mitigation measures shall be prepared and a copy submitted to the Ministry's Regional Office at Bhopal, CECB and CPCB within 3 months of issue of environment clearance letter.

- xiv. At least 5 % of the total cost of the project shall be earmarked towards the corporate social responsibility and item-wise details along with time bound action plan should be prepared and submitted to the Ministry's Regional Office at Bhubaneswar. Implementation of such program should be ensured accordingly in a time bound manner.
- xv. The company shall provide housing for construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, crèche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.

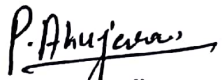
B. GENERAL CONDITIONS:

- i. The project authorities must strictly adhere to the stipulations made by the West Bengal State Pollution Control Board and the State Government.
- ii. No further expansion or modifications in the plant shall be carried out without prior approval of the Ministry of Environment and Forests.
- iii. The gaseous emissions from various process units shall conform to the load/mass based standards notified by this Ministry on 19th May, 1993 and standards prescribed from time to time. The State Board may specify more stringent standards for the relevant parameters keeping in view the nature of the industry and its size and location.
- iv. At least four ambient air quality monitoring stations should be established in the downward direction as well as where maximum ground level concentration of PM₁₀, SO₂ and NO_x are anticipated in consultation with the SPCB. Data on ambient air quality and stack emission shall be regularly submitted to this Ministry including its Regional Office at Bhubaneswar and the SPCB/CPCB once in six months.
- v. Industrial wastewater shall be properly collected, treated so as to conform to the standards prescribed under GSR 422 (E) dated 19th May, 1993 and 31st December, 1993 or as amended from time to time. The treated wastewater shall be utilized for plantation purpose.
- vi. The overall noise levels in and around the plant area shall be kept well within the standards (85 dBA) by providing noise control measures including acoustic hoods, silencers, enclosures etc. on all sources of noise generation. The ambient noise levels should conform to the standards prescribed under EPA Rules, 1989 viz. 75 dBA (daytime) and 70 dBA (nighttime).
- vii. Occupational health surveillance of the workers shall be done on a regular basis and records maintained as per the Factories Act.
- viii. The company shall develop surface water harvesting structures to harvest the rain water for utilization in the lean season besides recharging the ground water table.
- ix. The project proponent shall also comply with all the environmental protection measures and safeguards recommended in the EIA/EMP report. Further, the

company must undertake socio-economic development activities in the surrounding villages like community development programmes, educational programmes, drinking water supply and health care etc.

- x. Requisite amount shall be earmarked towards capital cost and recurring cost/annum for environment pollution control measures to implement the conditions stipulated by the Ministry of Environment and Forests as well as the State Government. An implementation schedule for implementing all the conditions stipulated herein shall be submitted to the Regional Office of the Ministry at Bhubaneswar. The funds so provided shall not be diverted for any other purpose.
- xi. A copy of clearance letter shall be sent by the proponent to concerned Panchayat, Zila Parishad/Municipal Corporation, Urban Local Body and the local NGO, if any, from whom suggestions/representations, if any, were received while processing the proposal. The clearance letter shall also be put on the web site of the company by the proponent.
- xii. The project proponent shall upload the status of compliance of the stipulated environment clearance conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of the MOEF at Bhubaneswar. The respective Zonal Office of CPCB and the SPCB. The criteria pollutant levels namely; PM10, SO₂, NO_x (ambient levels as well as stack emissions) or critical sectoral parameters, indicated for the projects shall be monitored and displayed at a convenient location near the main gate of the company in the public domain.
- xiii. The project proponent shall also submit six monthly reports on the status of the compliance of the stipulated environmental conditions including results of monitored data (both in hard copies as well as by e-mail) to the Regional Office of MOEF, the respective Zonal Office of CPCB and the SPCB. The Regional Office of this Ministry at Bhubaneswar/ CPCB / SPCB shall monitor the stipulated conditions.
- xiv. The environmental statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company alongwith the status of compliance of environmental conditions and shall also be sent to the respective Regional Office of the MOEF at Bhubaneswar by e-mail.
- xv. The Project Proponent shall inform the public that the project has been accorded environmental clearance by the Ministry and copies of the clearance letter are available with the SPCB and may also be seen at Website of the Ministry of Environment and Forests at <http://envfor.nic.in>. This shall be advertised within seven days from the date of issue of the clearance letter, at least in two local newspapers that are widely circulated in the region of which one shall be in the vernacular language of the locality concerned and a copy of the same should be forwarded to the Regional office at Bhubaneswar.
- xvi. Project authorities shall inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities and the date of commencing the land development work.

8. The Ministry may revoke or suspend the clearance, if implementation of any of the above conditions is not satisfactory.
9. The Ministry reserves the right to stipulate additional conditions if found necessary. The Company in a time bound manner shall implement these conditions.
10. Any appeal against this environmental clearance shall lie with the National Environment Appellate Authority, if preferred within a period of 30 days as prescribed under Section 11 of the National Environment Appellate Act, 1997.
11. The above conditions shall be enforced, inter-alia under the provisions of the Water (Prevention & Control of Pollution) Act, 1974, the Air (Prevention & Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986, Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008 and the Public (Insurance) Liability Act, 1991 along with their amendments and rules.


(Dr. P.L.Ahujara)
Scientist -F

Copy to:

1. The Secretary, Department of Environment, Govt. of West Bengal, Kolkata, West Bengal.
2. The Chairman, Central Pollution Control Board, Parivesh Bhavan, CBD-cum-Office Complex, East Arjun Nagar, Delhi-110032.
3. The Chairman, West Bengal Pollution Control Board, Parivesh Bhawan, 10A Block-LA, Sector-III, Salt Lake, Kolkata - 700091, West Bengal.
4. The Chief Conservator of Forests, Regional Office (EZ), Ministry of Environment and Forests A-3, Chandrashekharapur, Bhubaneswar - 751 023, Orissa
5. Adviser (IA-II), Ministry of Environment and Forests, Paryavaran Bhavan, CGO Complex, New Delhi.
6. Monitoring Cell, Ministry of Environment and Forests, Paryavaran Bhavan, CGO Complex, New Delhi.
7. Guard File.
8. Monitoring File.
9. Record File.


(Dr. P. L. Ahujara)
Scientist-F

NOC NO124864

WEST BENGAL POLLUTION CONTROL BOARD

Paribesh Bhawan
10A, Block-LA, Sector-III
Bidhannagar, Kolkata-700 090

Memo No. **845-2N-131/2008(E)**

Dated **28/10/2014**

From :
Member Secretary,
West Bengal Pollution Control Board



To: M/s. AIC IRON INDUSTRIES PVT. LTD.
25, GANESH CHANDRA AVENUE, 4th FLOOR,
KOLKATA - 700 013.

Sub: Consent to Establish (NOC) from Environmental Point of View

Ref: Your letter No. N11 Dated 15.09.2014

Dear Sirs,

In response to the application for Consent to Establish (NOC) for proposed ^{expansion} Unit of M/s. AIC Iron Industries Pvt. Ltd. for manufacturing/storage/installation of Sponge Iron - 10000 MT/month, MS Billets - 10000 MT/month, Electricity - 12 MW. at existing unit premises at Vill-Benipur, PO-Saltore, PS-Neturia, Dist.- Purulia. this is to inform you that this Board hereby grants the Consent to Establish (NOC) from the environmental point of the above subject to the following conditions and special conditions annexed.

1. The quality of sewage and trade effluent to be discharged from your factory shall satisfy the permissible limits as prescribed in IS : 2490 (Pt. I) of 1974, and/or its subsequent amendment and Environment (Protection) Rules 1986.
2. Suitable measures to treat your effluent shall be adopted by you in order to reduce the pollutional load so that the quality of the effluent satisfies the standards mentioned above.
3. You shall have to apply to this Board for its consent to operate and discharge of sewage and trade effluent according to the provisions of the water (Prevention & Control of Pollution) Act, 1974. No sewage or trade effluent shall be discharged by you without prior consent of this Board.
4. All emission from your factory shall conform to the standards as laid down by this Board.
5. No. emission shall be permitted without prior approval of this Board and you shall apply to this Board for its consent to operate and atmospheric emission as per provision of the Air (Prevention & Control Pollution) act, 1981.
6. No industrial plant, furnace, flues, chimneys, control equipment, etc. shall be constructed/reconstructed/erected/re-erected without prior approval of this Board.

M. M. Saha
Sr. Environmental Engineer
WB Pollution Control Board
Dept. of Environment, Govt. of West Bengal

7. You shall comply with
- Water (Prevention and Control of Pollution) Cess Act, 1977, if applicable.
 - Water (Prevention and Control of Pollution) Cess Act, 1977, if applicable.
 - Environment (Protection) Act, 1986
 - Environment (Protection) Rules, 1986
 - Hazardous Wastes (Management and Handling) Rules, 1989 and Amended Rules, 2000
 - Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 and Amended Rules, 2000
 - Manufacture, Use, Import and Storage and Hazardous Micro-Organisms, Genetically Engineered Organisms or Cell Rules, 1989
 - The Public Liability Insurance Act, 1991 and Amended Act, 1992
 - The Public Liability Insurance Rules, 1991 and Amended Rules 1993
 - Biomedical Wastes (Management & Handling) Rules, 1998 and Amended Rules 2000 if applicable.
 - Recycled Plastics Manufacture and Usage Rules 1999, if applicable and
 - Ozone Depleting Substances (Regulation & Control) Rules, 2000, if applicable
8. You will have to abide by any other stipulations as may be prescribed by any authority/local bodies/Government Departments etc.

SPECIAL CONDITION :

See annexure attached.

Gross capital investment for expansion project is :Rs.1012000000/-

Any violation of the aforesaid conditions shall entail cancellation of this Consent to Establish (NOC)

Yours faithfully,

[Signature]
Member Secretary, SR. ENV. ENGR.
West Bengal Pollution Control Board
(EIM CELL)

Sr. Environmental Engineer
WB Pollution Control Board
Dept. of Environment, GoWB

Memo No. 845-2N-131/2008(E) dtd. 28/10/2014.
Copy forwarded for information to :

- Chief Inspector of Factories, Government of West Bengal, N. S. Building, Kolkata-700 001
- Director of Industries/Director of Cottage & Small Scale Industries, Government of West Bengal, N. S. Building, Kolkata-700 001
- Guard file, West Bengal Pollution Control Board.
- Environmental Engineer, I/II/Alipur R.O./Howrah R.O./Hooghly R.O./B.R.O./D.R.O./Haldia R.O./S.R.O./Asansol/ Sub-R.O./WBPC Board

Himalaya Bhawan
Delhi Road, Dankuni
Dist. Hooghly

Vill, Panpur
Kalyani Expressway
P.O. Narayanpur
Dist. 24 Pgs. (N)

Sahid Khudiram Sarani
City Centre, Durgapur-16
Dist. Burdwan

10, Camac Street
2nd Floor
Kolkata-700 017

Paribesh Bhawan
10A, LA-Block, Sector-III
Salt Lake City,
Kolkata - 700 098

Block-05 at 40
Flats Complex
Adjacent to Priyambada
Housing Estate
P.O. : Khanjanchak,
P.S. Durgachak
Haldia-721602
Dist. : Purba Medinipur

Paribahan Nagar
Matigara, Siliguri
Dist.-Darjeeling

Satya Chowdhury
Indoor Stadium
Balurchar Bandh Road
Malda-732101

Asansol Sub-Regional Office
ADDA Commercial Market (2nd Floor)
Opposite Asansol Fire Station
G.T. Road, Asansol-713 301

[Signature]
Member Secretary, SR. E. E
West Bengal Pollution Control Board
(EIM CELL)
WB Pollution Control Board
Dept. of Environment, GoWB

Annexure to NOC Sl. No. NO124864
Special conditions issued to M/s. AIC Iron Industries Pvt. Ltd., VIII- Benipur, PO – Saltore, PS –
Neturia, Dist – Purulia (Expansion Project)

A) Emission:-

Sl. No	Emission sources	Air Pollution Control System	Stack (Nos. & height from GL in m.)
1.	Sponge Iron Plant		
	Rotary Kilns (4x100TPD)	WHIRB of capacity-10 TPH for each kiln; three field ESP and common stack for each separate set of 2X100 TPD rotary kilns	2 nos, 55m
	Individual bag filters to be installed at cooler discharge, product house, intermediate bin, coal crushing section and other dust prone areas with individual stacks, each of height 30 meters.		
2.	Captive Power Plant -12 MW (08 MW from WHIRB & 4 MW from AFBC boilers)		
	AFBC Boiler (1 x 25TPH)	3 field ESP	55 m
	WHIRB (10TPH individual for each of proposed 4x100 TPD DRI kilns)	ESP common with individual kiln	common with individual kiln
3.	2X15 T/heat Induction furnaces	Individual assembly of spark arrestor and bag filter for each furnace followed by common stack	30 m
4.	DG sets – 2X750 KVA		02 nos., 13 m each

- 1) Stacks should have sampling port, platform and ladder as per the Emission Regulation Part-III of CPCB. Continuous stack monitoring facilities should be provided with sponge iron units, ferro-alloy plant & CPP.
- 2) New Standards for sponge iron plant issued by MoEF vide G.S.R 414(E) dated 30th May,2008 shall be complied with.
- 3) The National Ambient Air Quality Emission Standards issued by MoEF vide G.S.R 826(E) dated 16th November,2009 should be complied with.
- 4) As proposed the unit shall not operate DRI kilns without WHIRB-ESP operation.
- 5) Dry fog system and water sprinklers to be installed to arrest fugitive emission.

B) Effluent:-

- 1) Process – Nil.
- 2) Cooling water to be recycled.
- 3) Domestic - to be discharged through septic tank to soak-pit within the unit premises.

C) Solid Waste :-

- 1) Fly ash to be sold to cement manufacturing units.
- 2) Dolo-char to be used in AFBC.
- 3) Bottom ash and slag from induction furnace to be used for land filling and road making.

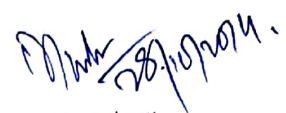
D) General:-

- 1) Noise Control – Ambient noise & D.G.Set noise level not to exceed the permissible limit.
- 2) No additional machinery / equipments can be installed without permission from this board.
- 3) Adequate arrangement for dust suppression in raw material handling section to be provided.
- 4) At least 33% of the project area should be under green belt.
- 5) Rain water harvesting must be done however recharging of harvested rain water is not allowed under any circumstances.

M. M. M.
28/07/2014
Sr. Environmental Engineer
WB Pollution Control Board
Dept. of Environment, GoWB

Annexure to NOC Sl. No. NO124864
Special conditions issued to M/s. AIC Iron Industries Pvt. Ltd., Vill- Benipur, PO – Saltore, PS –
Neturia, Dist – Purulia (Expansion Project)

- 6) Conditions laid down in the Environmental Clearance obtained for the project from MoEF, Govt of India must be strictly followed.
- 7) The conveyor belt for transferring materials to day bins & skip hoist to be covered.
- 8) Good house-keeping to be maintained.
- 9) Land conversion certificate, if applicable, should be obtained from the competent authority.
- 10) Permission for extracting ground water must be obtained from the competent authority.
- 11) This NOC is valid up to 31.10.2019 for setting up the unit.


Member Secretary
West Bengal Pollution Control Board.
Sr. Environmental Engineer
W B Pollution Control Board
Dept. of Environment, GoWB



Government of India
Ministry of Environment, Forest and Climate Change
(Impact Assessment Division)

To,

The Director

AIC IRON INDUSTRIES PVT LTD

25, Ganesh Chandra Avenue, 4th Floor, Kolkata - 700013,,Kolkata,West Bengal-700013

Subject: Grant of Environmental Clearance (EC) to the proposed Project Activity under the provision of EIA Notification 2006-regarding

Sir/Madam,

This is in reference to your application for Environmental Clearance (EC) in respect of project submitted to the Ministry vide proposal number IA/WB/IND/261199/2008 dated 27 Sep 2022. The particulars of the environmental clearance granted to the project are as below.

1. EC Identification No.	EC23A008WB169186
2. File No.	J-11011/566/2008-IA.II(I)
3. Project Type	Expansion
4. Category	A
5. Project/Activity including Schedule No.	3(a) Metallurgical industries (ferrous & non ferrous)
6. Name of Project	Proposed expansion of existing Steel Plant by installation of 1x400 TPD Sponge Iron Plant (1,32,000 TPA), Steel Melting Shop for total production of 2,60,500 TPA Billets, 0.192 MTPA Rolling Mill with
7. Name of Company/Organization	AIC IRON INDUSTRIES PVT LTD
8. Location of Project	West Bengal
9. TOR Date	11 Nov 2008

The project details along with terms and conditions are appended herewith from page no 2 onwards.

Date: 05/01/2023

(e-signed)
Dr. R. B. Lal
Scientist F
IA - (Industrial Projects - 1 sector)

Note: A valid environmental clearance shall be one that has EC identification number & E-Sign generated from PARIVESH. Please quote identification number in all future correspondence.

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PARIVESH

*(Pro-Active and Responsive Facilitation by Interactive,
and Virtuous Environment Single-Window Hub)*



F. No. J-11011/566/2008-IA-II(I)
Government of India
Ministry of Environment, Forest and Climate Change
(I.A. Division – Industry I sector)

Indira Paryavaran Bhawan
Vayu Wing, 3rd Floor,
Jor Bagh Road, Aliganj,
New Delhi – 110003

Dated: 4th January, 2023

To,

M/s. AIC Iron Industries Private Limited
25, Ganesh Chandra Avenue, 4th Floor, Kolkata,
West Bengal-700013
Email: manojpip863689@gmail.com

Project: Proposed expansion of existing Steel Plant by installation of 1x400 TPD Sponge Iron Plant (1,32,000 TPA), Steel Melting Shop for total production of 2,60,500 TPA Billets, 1,92,000 TPA Rolling Mill with 1x15 TPH Reheating Furnace and Captive Power Plant [20 MW (10 MW WHRB + 10 MW AFBC)] within the existing plant premises by M/s. AIC Iron Industries Private Limited located at Village Benipur, Tehsil Neturia, District Purulia, West Bengal – Grant of Environmental Clearance.

Sir,

This refers to your proposal no. IA/WB/IND/5663/2010 dated 27th September, 2022 received through PARIVESH Portal for grant of Environmental Clearance (EC) for the project mentioned above. Further, the PP has uploaded the information on portal on 04.11.2022 and 29.12.2022 on the above mentioned project.

2. As per the provisions of the Environment Impact Assessment (EIA) Notification, 2006, the above-mentioned project/activity is covered under category 'A' of schedule no. **3(a) Metallurgical Industries (ferrous & non-ferrous) and 1(d) Thermal Power Plants** and appraised at Central Level.

3. The above-mentioned proposal has been considered in **15th meeting of Expert Appraisal Committee (Industry-1 Sector) held on 17-18th October, 2022.** The minutes of the meeting and all the project documents are available on PARIVESH portal which can be accessed at <https://parivesh.nic.in>.

4. The details of the proposal are as per the EIA/EMP report submitted by the proponent. The salient features of the proposal as presented during the above-mentioned meetings of EAC (Industry 1 Sector) are as under: -

S. No.	Particulars	Details submitted by PP
a.	Terms of Reference for undertaking EIA study	24/01/2020
b.	Period of baseline data collection	December, 2019 - February, 2020
c.	Date of Public Consultation	15/02/2021
d.	Action plan to address the PH	An amount of Rs. 1.34 Crores have been earmarked to address the issues raised during public hearing and need based activity. Detail of activities

S. No.	Particulars	Details submitted by PP																	
	issues	proposed attached as Annexure 1.																	
e.	Location of the project	Village Benipur, Tehsil Neturia, District Purulia, West Bengal																	
f.	Latitude and Longitude of the project site	<table><tr><th>Point</th><th>Latitude</th><th>longitude</th></tr><tr><td>1</td><td>23°39'31.61"N</td><td>86°47'41.98"E</td></tr><tr><td>2</td><td>23°39'29.44"N</td><td>86°47'54.64"E</td></tr><tr><td>3</td><td>23°39'22.51"N</td><td>86°47'50.25"E</td></tr><tr><td>4</td><td>23°39'24.49"N</td><td>86°47'40.13"E</td></tr></table>	Point	Latitude	longitude	1	23°39'31.61"N	86°47'41.98"E	2	23°39'29.44"N	86°47'54.64"E	3	23°39'22.51"N	86°47'50.25"E	4	23°39'24.49"N	86°47'40.13"E		
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4	23°39'24.49"N	86°47'40.13"E																	
g.	Total land	10.01 ha [Private: 10.01 ha]																	
h.	Land acquisition details as per MoEF&CC O.M. dated 7/10/2014	Expansion project is proposed in existing project area of 10.01 ha. Complete land of 10.01 ha is under possession of company. No additional land is required for proposed project.																	
i.	Existence of habitation & involvement of R&R, if any	Project site: No habitation exists within the project site and R & R is not applicable. <table><tr><th>Habitation</th><th>Distance</th><th>Direction</th></tr><tr><td>Boropukur village</td><td>0.6 km</td><td>ESE</td></tr><tr><td>Benipur</td><td>0.1 km</td><td>NNE</td></tr></table>			Habitation	Distance	Direction	Boropukur village	0.6 km	ESE	Benipur	0.1 km	NNE						
Habitation	Distance	Direction																	
Boropukur village	0.6 km	ESE																	
Benipur	0.1 km	NNE																	
j.	Elevation of the project site	140 m AMSL																	
k.	Involvement of Forest land if any.	No involvement of Forest Land.																	
l.	Water body exists within the project site as well as study area	Project Site: No water body in the project site. Study area: <table><tr><th>Water Body</th><th>Distance</th><th>Direction</th></tr><tr><td>Damodar River</td><td>2.8 km</td><td>NW</td></tr><tr><td>Panchet Reservoir</td><td>3.84 km</td><td>West</td></tr><tr><td>Baranti Reservoir</td><td>8.66 km</td><td>SSE</td></tr></table>			Water Body	Distance	Direction	Damodar River	2.8 km	NW	Panchet Reservoir	3.84 km	West	Baranti Reservoir	8.66 km	SSE			
Water Body	Distance	Direction																	
Damodar River	2.8 km	NW																	
Panchet Reservoir	3.84 km	West																	
Baranti Reservoir	8.66 km	SSE																	
m.	Existence of ESZ / ESA / national park / wildlife Sanctuary / biosphere Reserve / tiger reserve / elephant reserve etc. if any within the study area	Project Site: Nil However, following forest is located within study area: Panchet RF: 3.20 km/ SSW																	
n.	Project cost	The capital cost of the project is Rs. 392 Crores																	
o.	EMP cost	<table><tr><th>Type</th><th>Capital (Rs. in Crores)</th><th>Recurring (Rs. in Crores)</th></tr><tr><td>Proposed</td><td>Rs22.0 Crores(including technological mitigation cost)</td><td>Rs 2.4 Crores</td></tr></table>	Type	Capital (Rs. in Crores)	Recurring (Rs. in Crores)	Proposed	Rs22.0 Crores(including technological mitigation cost)	Rs 2.4 Crores											
Type	Capital (Rs. in Crores)	Recurring (Rs. in Crores)																	
Proposed	Rs22.0 Crores(including technological mitigation cost)	Rs 2.4 Crores																	
p.	Employment opportunity	The employment generation from the proposed project is 400																	
q.	Water and Power requirement	Water – Total 497.5 m3/day make up water (Fresh Water 397.5 m3/day and recycled water 100 m3/day) will be required for the entire project., As per the estimation the total power requirement for the entire project will be around 37.5 MW																	

Unit configuration and capacity:

S. No.	Plant Equipment/Facility	Existing facilities as per EC dated 27/08/2010 and CTE dated 15/12/2006 from WBPCB								Proposed Units		Final (Existing + Proposed)	
		Total (A+B)		Implemented (A)		Un-implemented (B)		As per CTO					
		Config-uration	Capacity (TPA)	Config-uration	Capacity (TPA)	Config-uration	Capacity (TPA)	Config-uration	Capacity (TPA)	Config-uration	Capacity (TPA)	Config-uration	Capacity (TPA)
1.	Sponge Iron	4x100 TPD DRI Kilns	1,20,000	--	--	4x100 TPD DRI Kilns	1,20,000	--	--	1x400 TPD DRI Kiln	1,32,000	1x400 TPD DRI Kiln	1,32,000
2.	Induction Furnace with CCM/LRF AOD/VOD	IF: 1x3 T + 1x6 T + 2x15 T	28,800 + 1,20,000	IF: 1x3 T + 1x6 T + 1x15 T	28,800 + 49,500	IF: 1x15 T	70,500	IF: 1x3 T + 1x6 T + 1x15 T	28,800 + 49,500	IF: 3x15 T (existing 1x3 T + 1x6 T will be replaced with 2x10 T)	1,48,500 liquid steel/ 1,46,000 Billets	IF: 2x10 T + 4x15 T	2,60,500 Billets
3.	Rolling Mill Structural Steels (Angles, Channels, Joist, TMT Bars, Wire Rod, Strips & Pipes etc.) with 1x15 TPH Reheating Furnace.	--	--	--	--	--	--	--	--	--	1,92,000	--	1,92,000
4.	Captive Power Plant	--	12 MW CPP (8 MW WHRB + 4 MW AFBC)	--	--	--	12 MW CPP (8 MW WHRB + 4 MW AFBC)	--	--	--	20 MW CPP (10 MW WHRB + 10 MW AFBC)	--	20 MW CPP (10 MW WHRB + 10 MW AFBC)

5. The EAC, in its meeting held during **17-18th October, 2022**, inter-alia, deliberated the following:

- The instant proposal is for expansion of existing Steel Plant by installation of 1x400 TPD Sponge Iron Plant (1,32,000 TPA), Steel Melting Shop for total production of 2,60,500 TPA Billets, 1,92,000 TPA Rolling Mill with 1x15 TPH Reheating Furnace and Captive Power Plant [20 MW (10 MW WHRB + 10 MW AFBC)] within the existing plant premises.
- The EAC, constituted under the provision of the EIA Notification, 2006 comprising Expert Members/domain experts in various fields, examined the proposal submitted by the Project Proponent in desired format along with EIA/EMP reports prepared and submitted by the Consultant accredited by the QCI/ NABET on behalf of the Project Proponent.

- iii. The EAC noted that the Project Proponent has given an undertaking that the data and information given in the application and enclosures are true to the best of his knowledge and belief and no information has been suppressed in the EIA/EMP reports. If any part of data/information submitted is found to be false/ misleading at any stage, the project will be rejected and Environmental Clearance given, if any, will be revoked at the risk and cost of the project proponent.
- iv. The Committee noted that the EIA reports are in compliance of the ToR issued for the project, reflecting the present environmental status and the projected scenario for all the environmental components. The Committee deliberated on the proposed mitigation measure towards Air, Water, Noise and Soil pollutions. The Committee suggested that the storage of toxic/explosive raw materials/products shall be undertaken with utmost precautions and following the safety norms and best practices.
- v. The existing project was accorded Consent to Establish (NOC) from West Bengal Pollution Control Board vide Consent Letter Memo. No 1334/I-WPBA-NOC (816)/05 dated 15/12/2006 and Consent Letter Memo. No 478/WPBA-NOC (816)/05 dated 03.05.2010 for 1x3 T and 1x6 T Induction Furnaces. Environmental Clearance is accorded ministry letter no F. No. J-11011/566/2008-IA II(I) dated 27/08/2010 for 4x100 TPD DRI Kiln, 2x15 T Induction Furnaces and CPP of 12 MW CPP (8 MW WHRB + 4 MW AFBC). Except 1x15 T Induction Furnaces, the project proponent could not implement other facilities envisaged in the EC dated 27/08/2010.
- vi. The total project area is 10.01 ha. Expansion project is proposed in existing project area. Complete land is under possession of company.
- vii. The nearest habitation to plant are Benipur (0.1 km, NNE) and Boropukur (0.6 km, NNE) from the project site boundary.
- viii. The water requirement for the existing & proposed expansion project is estimated as 497.5 m³/day (Fresh Water 397.5 m³/day and recycled water 100 m³/day). The raw water will be sourced from Damodar River through DVRRC supply (after expansion).
- ix. Damodar River (2.8 Km, NW), Panchet Reservoir (3.84 Km, W) and Baranti Reservoir (8.66 Km, SSE) exists within the study area. The EAC is of the opinion that water body shall not be disturbed. Mitigation measures w.r.t. safeguarding the water body shall be implemented.
- x. The Committee has found that the baseline data and incremental GLC due to the proposed project within NAAQ standards.
- xi. The EAC noted that existing green belt has been developed in 3.30 ha (8.16 acres) of land within the plant premises where around 6000 number of trees (@1500 trees per hectares) have been planted. There is plan to develop further greenbelt by planting more trees @2500 trees per hectares. There will be total 8250 number of trees within the plant area. Hence, additional 2250 number of trees shall be planted. The Committee deliberated on the action plan and budget allocation for green belt development and is of the opinion that greenbelt shall be developed in 33% project area @2500 trees per hectares within a year.
- xii. The committee deliberated details of carbon foot prints and carbon sequestration study w.r.t. proposed project and found them to be satisfactory.
- xiii. The Committee also deliberated on the public hearing issues along with action plan submitted by the proponent to address the issues raised during the public hearing and found it satisfactory.
- xiv. The Committee deliberated upon the certified compliance report of IRO MoEFCC as well as action taken report submitted by PP along with review report by IRO and is of the opinion that PP shall strictly comply with the partially complied conditions reported by IRO as per the submitted action plan.

- xv. The Committee also deliberated on the reply of PP to the points raised during the previous EC application and found it satisfactory.
- xvi. The EAC deliberated on the proposal with due diligence in the process as notified under the provisions of the EIA Notification, 2006, as amended from time to time and accordingly made the recommendations to the proposal. The Experts Members of the EAC found the proposal in order and recommended for grant of environmental clearance.
- xvii. The environmental clearance recommended to the project/activity is strictly under the provisions of the EIA Notification 2006 and its subsequent amendments. It does not tantamount/construe to approvals/consent/permissions etc. required to be obtained or standards/conditions to be followed under any other Acts/ Rules/ Subordinate legislations, etc., as may be applicable to the project. The project proponent shall obtain necessary permission as mandated under the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981, as applicable from time to time, from the State Pollution Control Board, prior to construction & operation of the project.

6. The EAC, in its 15th meeting of Expert Appraisal Committee (Industry-1 Sector) held on 17-18th October, 2022, based on information & clarifications provided by the project proponent and after detailed deliberations **recommended** the instant proposal for grant of Environment Clearance under the provisions of EIA Notification, 2006 subject to stipulation of certain specific conditions and general conditions as per the Ministry's Office Memorandum No. 22-34/2018-III dated 9/8/2018 based on project specific requirements.

7. The matter has been examined in the Ministry and it was noted that one of the non-compliance of earlier EC is that the OCMS has not been installed by the PP in spite of lapse of more than 10 years after grant of earlier EC. As per ATR submitted to IRO, MoEFCC, PP has submitted copy of purchase order for OCMS and has committed to install the same by November 2022. In this context, the PP vide letter dated 29.12.2022 confirmed that the PP has installed the OCMS at the existing plant and the same has been connected with SPCB server. The relevant photographs along with the sample data downloaded from SPCB server are submitted on Parivesh portal by the PP.

8. The MoEF&CC has examined the proposal in accordance with the Environment Impact Assessment (EIA) Notification, 2006 & further amendments thereto and after accepting the recommendations of the Expert Appraisal Committee (Industry-1 Sector) hereby decided to grant **Environment Clearance for instant proposal of M/s. AIC Iron Industries Private** Limited under the provisions of EIA Notification, 2006 subject to the following specific conditions and general conditions:

A. Specific conditions:

- i. The project proponent shall comply with all the environmental protection measures and safeguards proposed in the documents submitted to the Ministry. All the recommendations made in the EIA/EMP in respect of environmental management, and risk mitigation measures relating to the project shall be implemented.
- ii. The project proponent shall utilize modern technologies for capturing of carbon emitted and shall also develop carbon sink/carbon sequestration resources capable of capturing more than emitted. The implementation report shall be submitted to the IRO, MoEF&CC in this regard.
- iii. 497.5 m³ /day of water requirement after the proposed expansion shall be met from Damodar River through DVRRC supply (397.5 m³ /day) and 100 m³ /day shall be recycled. No ground water shall be abstracted.
- iv. Following additional arrangements to control fugitive dust shall be provided:

- a. Fog / Mist Sprinklers at all conveyors point and on bulk raw material storage area (at the transfer points) like Iron Ore, Coal and for Fly Ash and similar solid waste storage areas.
- b. Proper covered vehicle shall be used while transport of materials.
- c. Wheel Washing mechanism shall be provided in entry and exit gates with complete recirculation system.
- v. All internal road and connecting road from project site to main highway shall be developed and maintained with suitable Million Axle Standard (MSA) as per the traffic load due to existing and proposed project.
- vi. All stockyards shall be having impervious flooring and shall be equipped with water spray system for dust suppression. Stock yards shall also have garland drains to trap the run off material.
- vii. Performance test shall be conducted on all pollution control systems every year and report shall be submitted to Regional Office of the MoEF&CC.
- viii. Particulate matter emission from stacks shall be less than 30 mg/Nm^3 . Action plan submitted to limit the dust emission shall be strictly implemented.
- ix. Solid waste utilization
 - a. PP shall install a slag crusher to convert steel slag into aggregate for use in construction industry, fine sand for use as flux in steel plant, sand in brick making and as lime in cement making.
 - b. PP shall recycle/reuse 100 % solid waste generated in the plant.
 - c. Used refractories shall be recycled as far as possible.
- x. Damodar River (2.8 Km, NW), Panchet Reservoir (3.84 Km, W) and Baranti Reservoir (8.66 Km, SSE) exists within the study area. A robust and full proof Drainage Conservation scheme to protect the natural drainage and its flow parameters; along with Soil conservation scheme and multiple Erosion control measures shall be implemented.
- xi. The proposed project shall be designed as "Zero Liquid Discharge" Plant. ETP shall be installed and there shall be no discharge of effluent from the plant. Domestic effluent shall be treated in Sewage Treatment Plant. MSW waste shall be treated in digester and recovered gas shall be used in the canteen.
- xii. The company shall also undertake rain water harvesting measures as per the plan submitted in the EIA/EMP report and reduce water dependence from the outside source.
- xiii. Benipur (0.1 km, NNE) and Boropukur (0.6 km, NNE) exists within the study area of project site. Project Proponent shall take appropriate environmental safeguard measures to minimise the impact on the habitation of the locals. The company shall also include this location in its environmental monitoring programme.
- xiv. As committed to adopt Benipur village, project proponent shall prepare and implement a robust plan to develop it into model villages in next 10 years.
- xv. A proper action plan must be implemented to dispose of the electronic waste generated in the industry.
- xvi. Three tier Green Belt shall be developed in at least 33% of the project area in a time frame of one year with native species all along the periphery of the project site of adequate width and tree density shall not be less than 2500 per ha. Survival rate of green belt developed shall be monitored on periodic basis to ensure that damaged plants are replaced with new plants in the subsequent years. Compliance status in this regard, shall be submitted to concerned Regional Office of the MoEF&CC.

- xvii. Greening and Paving shall be implemented in the plant area to arrest soil erosion and dust pollution from exposed soil surface.
- xviii. Air Cooled condensers shall be used in the captive power plant.
- xix. During operational phase at Captive Power Plant, PP shall measure coal dust exposures and to maintain coal dust exposures within stipulated standards at coal handling areas. PP shall identify extreme hot areas through heat stress survey as well as noise monitoring within process plants to ensure that workers not exposed above 90 dBA levels as per Factories Act, 1948.
- xx. All the commitments made to the public during the Public Hearing/Public Consultation shall be satisfactorily implemented. The action plan based on the social impact assessment study of the project as per the EMP in accordance to the Ministry's OM dated 30.09.2020 shall be strictly implemented and progress shall be submitted to the Regional Office of MoEF&CC.
- xxi. The project proponent shall maintain the records on the total dust generated per month and the percentage of dust captured by pollution control equipments and to be submitted to IRO on six-monthly basis.
- xxii. The Plastic Waste Management Rules 2016, inter-alia, mandated banning of identified Single Use Plastic (SUP) items with effect from 01/07/2022. In this regard, CPCB has issued a direction to all the State Pollution Control Boards (SPCBs)/Pollution Control Committees (PCCs) on 30/06/2022 to ensure the compliance of Notification published by Ministry on 12/08/2021. The technical guidelines issued by the CPCB in this regard is available at <https://cpcb.nic.in/technical-guidelines-3/>. All the project proponents are hereby requested to sensitize and create awareness among people working within the Project area as well as its surrounding area on the ban of SUP in order to ensure the compliance of Notification published by this Ministry on 12/08/2021. A report, along with photographs, on the measures taken shall also be included in the six monthly compliance report being submitted by the project proponents.
- xxiii. The project proponent shall adopt the Clean Air practices like mechanical collectors, wet scrubbers, fabric filters (bag houses), electrostatic precipitators, combustion systems (thermal oxidizers), condensers, absorbers, adsorbers, and biological degradation. Controlling emissions related to transportation shall include emission controls on vehicles as well as use of cleaner fuels. Sufficient numbers of additional truck mounted Fog/Mist water cannons shall be procured and operated regularly inside the project premises and also in the surrounding villages to arrest suspended dust in the atmosphere.

B. General conditions:

I. Statutory compliance:

- i. The Environment Clearance (EC) granted to the project/ activity is strictly under the provisions of the EIA Notification, 2006 and its amendments issued from time to time. It does not tantamount/ construe to approvals/ consent/ permissions etc., required to be obtained or standards/conditions to be followed under any other Acts/Rules/Subordinate legislations, etc., as may be applicable to the project.

II. Air quality monitoring and preservation

- i. The project proponent shall install 24x7 continuous emission monitoring system at process stacks to monitor stack emission as well as two Continuous Ambient Air Quality Station (CAAQS) for monitoring AAQ parameters with respect to standards prescribed in Environment (Protection) Rules 1986 as amended from time to time. The CEMS and CAAQMS shall be connected to SPCB and CPCB online servers and calibrate these systems

from time to time according to equipment supplier specification through labs recognised under Environment (Protection) Act, 1986 or NABL accredited laboratories.

- ii. The project proponent shall monitor fugitive emissions in the plant premises at least once in every quarter through laboratories recognized under Environment (Protection) Act, 1986 or NABL accredited laboratories.
- iii. Appropriate Air Pollution Control (APC) system shall be provided for all the dust generating points including fugitive dust from all vulnerable sources, so as to comply prescribed stack emission and fugitive emission standards.
- iv. The project proponent shall provide leakage detection and mechanized bag cleaning facilities for better maintenance of bags.
- v. Recycle and reuse iron ore fines, coal and coke fines, lime fines and such other fines collected in the pollution control devices and vacuum cleaning devices in the process after briquetting/agglomeration.
- vi. The project proponent shall ensure covered transportation and conveying of ore, coal and other raw material to prevent spillage and dust generation.
- vii. The project proponent shall provide primary and secondary fume extraction system at all melting furnaces.
- viii. Design the ventilation system for adequate air changes as per prevailing norms for all tunnels, motor houses, Oil Cellars.

III. Water quality monitoring and preservation

- i. The project proponent shall install 24x7 continuous effluent monitoring system with respect to standards prescribed in Environment (Protection) Rules 1986 (G.S.R 414 (E) dated 30th May 2008; G.S.R 277 (E) dated 31st March 2012 (applicable to IF/EAF); S.O. 3305 (E) dated 7th December 2015 (Thermal Power Plants) as amended from time to time and connected to SPCB and CPCB online servers and calibrate these system from time to time according to equipment supplier specification through labs recognised under Environment (Protection) Act, 1986 or NABL accredited laboratories.
- ii. The project proponent shall monitor regularly ground water quality at least twice a year (pre- and post-monsoon) at sufficient numbers of piezometers/sampling wells in the plant and adjacent areas through labs recognised under Environment (Protection) Act, 1986 and NABL accredited laboratories.
- iii. Sewage Treatment Plant shall be provided for treatment of domestic wastewater to meet the prescribed standards.
- iv. The project proponent shall provide the ETP for effluents of rolling mills to meet the standards prescribed in G.S.R 277 (E) 31st March 2012 (applicable to IF/EAF) as amended from time to time.
- v. Garland drains and collection pits shall be provided for each stock pile to arrest the run-off in the event of heavy rains and to check the water pollution due to surface run off.
- vi. Tyre washing facilities shall be provided at the entrance/exit of the plant gates.

IV. Noise monitoring and prevention

- i. Noise quality shall be monitored as per the prescribed Noise Pollution (Regulation and Control) Rules, 2000 and report in this regard shall be submitted to Regional Officer of the Ministry as a part of six-monthly compliance report.

V. Energy Conservation measures

- i. Energy conservation measures may be adopted such as adoption of solar energy and provision of LED lights etc., to minimize the energy consumption.

VI. Waste management

- i. Used refractories shall be recycled.
- ii. Kitchen waste shall be composted or converted to biogas for further use.

VII. Green Belt

- i. The project proponent shall prepare GHG emissions inventory for the plant and shall submit the programme for reduction of the same including carbon sequestration including plantation.
- ii. Project proponent shall submit a study report on De-carbonization program, which would essentially consist of company's carbon emissions, carbon budgeting/ balancing, carbon sequestration activities and carbon capture, use and storage and offsetting strategies. Further, the report shall also contain time bound action plan to reduce its carbon intensity of its operations and supply chains, energy transition pathway from fossil fuels to Renewable energy etc. All these activities/ assessments should be measurable and monitor able with defined time frames.

VIII. Public hearing and Human health issues

- i. Emergency preparedness plan based on the Hazard identification and Risk Assessment (HIRA) and Disaster Management Plan shall be implemented.
- ii. The project proponent shall carry out heat stress analysis for the workmen who work in high temperature work zone and provide Personal Protection Equipment (PPE) as per the norms of Factory Act.
- iii. Occupational health surveillance of the workers shall be done on a regular basis and records maintained.

IX. Environment Management

- i. The project proponent shall comply with the provisions contained in this Ministry's OM vide F.No. 22-65/2017-IA.III dated 30/09/2020. As part of Corporate Environment Responsibility (CER) activity, company shall adopt nearby villages based on the socio-economic survey and undertake community developmental activities in consultation with the village Panchayat and the District Administration as committed.
- ii. The company shall have a well laid down environmental policy duly approve by the Board of Directors. The environmental policy should prescribe for standard operating procedures to have proper checks and balances and to bring into focus any infringements/deviation/violation of the environmental / forest / wildlife norms / conditions. The company shall have defined system of reporting infringements / deviation / violation of the environmental / forest / wildlife norms / conditions and / or shareholders / stake holders. The copy of the board resolution in this regard shall be submitted to the MoEF&CC as a part of six-monthly report.

- iii. A separate Environmental Cell both at the project and company head quarter level, with qualified personnel shall be set up under the control of senior Executive, who will directly to the head of the organization.

X. Miscellaneous

- i. The project proponent shall make public the environmental clearance granted for their project along with the environmental conditions and safeguards at their cost by prominently advertising it at least in two local newspapers of the District or State, of which one shall be in the vernacular language within seven days and in addition this shall also be displayed in the project proponent's website permanently.
- ii. The copies of the environmental clearance shall be submitted by the project proponents to the Heads of local bodies, Panchayats and Municipal Bodies in addition to the relevant offices of the Government who in turn has to display the same for 30 days from the date of receipt.
- iii. The project proponent shall upload the status of compliance of the stipulated environment clearance conditions, including results of monitored data on their website and update the same on half-yearly basis.
- iv. The project proponent shall monitor the criteria pollutants level namely; PM10, SO2, NOx (ambient levels as well as stack emissions) or critical sectoral parameters, indicated for the projects and display the same at a convenient location for disclosure to the public and put on the website of the company.
- v. The project proponent shall submit six-monthly reports on the status of the compliance of the stipulated environmental conditions on the website of the ministry of Environment, Forest and Climate Change at environment clearance portal.
- vi. The project proponent shall submit the environmental statement for each financial year in Form-V to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently and put on the website of the company.
- vii. The project proponent shall inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities, commencing the land development work and start of production operation by the project.
- viii. The project proponent shall abide by all the commitments and recommendations made in the EIA/EMP report, commitment made during Public Hearing and also that during their presentation to the Expert Appraisal Committee.
- ix. The PP shall put all the environment related expenditure, expenditure related to Action Plan on the PH issues, and other commitments made in the EIA/EMP Report etc. in the company web site for the information to public/public domain. The PP shall also put the information on the left over funds allocated to EMP and PH as committed in the earlier ECs and shall be carried out and spent in next three years, in the company web site for the information to public/public domain.
- x. No further expansion or modifications in the plant shall be carried out without prior approval of the Ministry of Environment, Forests and Climate Change (MoEF&CC).

xi. The Regional Office of this Ministry shall monitor compliance of the stipulated conditions. The project authorities should extend full cooperation to the officer (s) of the Regional Office by furnishing the requisite data / information/monitoring reports.

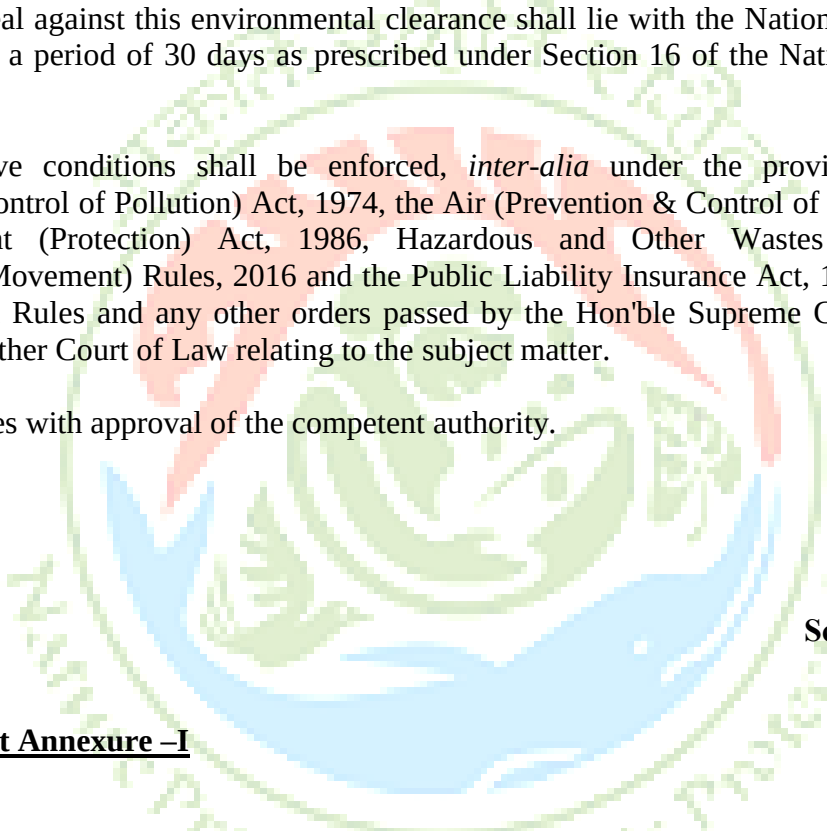
9. The Ministry reserves the right to stipulate additional conditions, if found necessary at subsequent stages and the project proponent shall implement all the said conditions in a time bound manner. The Ministry may revoke or suspend the environmental clearance, if implementation of any of the above conditions is not found satisfactory.

10. Concealing factual data or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of this clearance and attract action under the provisions of the Environment (Protection) Act, 1986.

11. Any appeal against this environmental clearance shall lie with the National Green Tribunal, if preferred, within a period of 30 days as prescribed under Section 16 of the National Green Tribunal Act, 2010.

12. The above conditions shall be enforced, *inter-alia* under the provisions of the Water (Prevention & Control of Pollution) Act, 1974, the Air (Prevention & Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986, Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 and the Public Liability Insurance Act, 1991 along with their amendments and Rules and any other orders passed by the Hon'ble Supreme Court of India / High Courts and any other Court of Law relating to the subject matter.

13. This issues with approval of the competent authority.



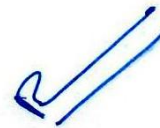
(Dr. R. B. Lal)
Scientist 'F'/ Director
Tel: 011-20819346
Email-rb.lal@nic.in

Encl. as above at Annexure –I

Copy to: -

1. The Secretary, Department of Environment, Government of West Bengal, Secretariat Kolkata.
2. The Secretary, Department of Forests, Government of West Bengal, Kolkata.
3. The Director General of Forest, Ministry of Environment, Forest and Climate Change, New Delhi.
4. The Principal Chief Conservator of Forests, Government of West Bengal, Block LA, 10A Sector-III, Salt Lake City, Kolkata-700098.
5. The Deputy Director General of Forests (C), Integrated Regional Office, Ministry of Environment, Forest and Climate Change, IB-198, Sector-II, Salt Lake City, Kolkata – 700106
6. The Chairman, Central Pollution Control Board, CBD-Cum-Office Complex, East Arjun Nagar, New Delhi-110 032.
7. The Chairman, West Bengal State Pollution Control Board, Paribesh Bhawan, 10A- Block LA, Sector –III, Salt Lake City, Kolkata – 700 098.

8. The Member Secretary, Central Ground Water Authority, Jamnagar House, 18/11, Man Singh Road Area, New Delhi 110001.
9. Monitoring Cell, Ministry of Environment, Forest and Climate Change, Indira Paryavaran Bhawan, Jor Bagh Road, New Delhi.
10. District Collector, Purulia District, West Bengal.
11. Guard File/Monitoring File/Website/Record File/ Parivesh Portal.



- **(Dr. R. B. Lal)**
Scientist 'F'/ Director
Tel: 011-20819346
Email-rb.lal@nic.in



Table: Action Plan as per Ministry's O.M. dated 30/09/2020

Concerns raised during Public Hearing	Physical Activity and Action Plan	Particulars	YEAR OF IMPLEMENTATION			Total Expenditure (Rs. in Lakhs)
			1 st Year	2 nd Year	3 rd Year	
Employment of local people	In the proposed project, top most priority will be given to the local people based on their academic qualification.	Physical Target	Construction of 2 - room training building (1300 sq. ft area) and installation of 5 computer systems & 3 machines for making hand craft items along with necessary raw materials, based on the need of the local people			20
	Skill development for unemployed local youths through National Skill Development Corporation, Govt. of India Scheme. Construction of a building along with the necessary infrastructure for this purpose.	Budget in Lakhs	15	5	-	
Measures for Environmental Protection	• Adequate control measures like installation of ESP, Bag filters, dust suppression system & stacks of adequate height at relevant places will be installed. • Air borne dust shall be controlled by mobile water tanker inside the plant premises. • Maintenance of air pollution control equipment shall be done regularly. • All roads shall be paved on which movement of raw materials or products will take place inside the plant premises. • No waste water will be discharged outside the plant area. The plant is designed as a zero discharge plant. The	Physical Target	The physical Target for the entire activities shall be achieved in 3 years.			-
		Budget in Lakhs	Included in the EMP Cost.			

Concerns raised during Public Hearing	Physical Activity and Action Plan	Particulars	YEAR OF IMPLEMENTATION			Total Expenditure (Rs. in Lakhs)
			1 st Year	2 nd Year	3 rd Year	
	entire wastewater will be recirculated and recycled. • The equipment shall comply with the Statutory limit of 85 dB(A) (at 1 m. from the source). Noise Reduction Systems will be arranged.					
Groundwater shall not be withdrawn	Total Make up water for the entire Project shall be 397.5 m ³ /day which will be sourced from Damodar River.	Physical Target	-	-	-	
		Budget in Lakhs	-	-	-	
To take care of local people's health	A charitable dispensary shall be constructed having basic facilities, trained nurses and qualified doctors for treatment of the local people.	Physical Target	Construction of a charitable dispensary (1500 sq. ft area) at village Sarbari			40
		Budget in Lakhs	25	15	-	
Organizing Health Camps for health check-up of locals	Health camps shall be organized in the surrounding villages for health check-up of the local villagers.	Physical Target	It will be done on regular basis.			
		Budget in Lakhs	As per requirement.			
Proper Supply of Drinking Water	Drinking water shall be supplied through tanker and tubewells shall be installed for drawing drinking water.	Physical Target	Procurement of 1 tanker	Development of 2 tube wells at Ramkanali & Shunuri villages	Development of 2 tube wells at Bhurkunrabari and Digha villages	10
		Budget in Lakhs	6	2	2	
Regarding Water Scarcity	The water required for the proposed project will be taken from the Damodar River and therefore there will be no need for ground water, so there will be no question of depletion of ground water. Construction of Rain Water Harvesting structures for groundwater recharging and rain water surface storage tanks in nearby villages shall be	Physical Target	Construction of 2 Rain Water Harvesting structures at Sarbari & Digha villages	Construction of 1 Rain Water storage pond at Shunuri village	Construction of 1 Rain Water storage pond at Ramkanali	7
		Budget in Lakhs	5	1	1	

Concerns raised during Public Hearing	Physical Activity and Action Plan	Particulars	YEAR OF IMPLEMENTATION			Total Expenditure (Rs. in Lakhs)
			1 st Year	2 nd Year	3 rd Year	
	done.					
Regarding Measures to prevent Water Pollution	The plant is designed as a zero-discharge plant. The water will be recirculated through cooling and treatment. The entire waste water will be recycled for various purposes inside the plant. Domestic wastewater will be treated in Sewage Treatment Plant (STP).	Physical Target	The physical Target for the entire activities shall be achieved in 3 years.			
		Budget in Lakhs	Included in the EMP Cost.			
Maintenance & repairing of roads in the surrounding areas	Maintenance & repairing of 3 km roads in the surrounding villages.	Physical Target	Construction of 1 km and repairing of existing roads at Sarbari village	Construction of 1 km and repairing of existing roads at Shunri village	Construction of 1 km and repairing of existing roads at Madhukunda village	30
		Budget in Lakhs	10	10	10	
Proper implementation of the CSR fund in consultation with local committee	The company has identified certain areas, to be considered for imparting the CER activities in the context of the local scenario of the area. The CER activities will be implemented in consultation and co-ordination with the local authorities.	Physical Target	The physical Target for the entire activities shall be achieved in 3 years.			-
		Budget in Lakhs	As per requirement.			
Greenbelt development within the plant premises	Proper plantation of trees will be done inside the plant premises.	Physical Target	The physical Target for the entire activities shall be achieved in 3 years.			
	The Company has earmarked 3.30 hectares (8.16 acres) of land for Green Belt Development out of total 10.01 hectares (24.74 acres) of total land within its plant area at Village: Benipur, P.O.: Saltor, P.S.: Neturia, Dist: Purulia in West Bengal.	Budget in Lakhs	Included in the EMP cost			

Concerns raised during Public Hearing	Physical Activity and Action Plan	Particulars	YEAR OF IMPLEMENTATION			Total Expenditure (Rs. in Lakhs)
			1 st Year	2 nd Year	3 rd Year	
	3.30 hectares (8.16 acres) of land for greenery are already developed as greenbelt within the plant premises where around 5000 number of trees (@1500 trees per hectares) have been planted. There is plan to develop further greenbelt by planting more trees @2500 trees per hectares. There will be total 8250 number of trees within the plant area. Hence, additional 3250 number of trees shall plant.					
Maintenance of local schools	Development of building infrastructure, playground, class rooms, library facilities and providing computers in the Local Adibashi School.	Physical Target	Renovation & repairing of school building at Sarbari village	Supplying desks, benches, blackboards at Digha village	Development of playground and library at Shunuri village	8
		Budget in Lakhs	3	2	3	
Regarding scholarship for local students	Scholarships shall be provided to the local meritorious students for carrying out higher studies.	Physical Target	It will be done on regular basis.			-
		Budget in Lakhs	As per requirement.			
Total Budget - Public Hearing related: Rs. 115 Lakhs						

Need based Activities	Particulars	Year of Implementation			Total Expenditure (Rs. In Lakhs)
		1 st Year	2 nd Year	3 rd Year	
Street Lighting (Solar) provision at suitable public places in and around the nearby villages (15 numbers, @ Rs. 20,000/- per Solar Light)	Physical Target:	Providing 5 nos. Solar light at village Sarbari	Providing 5 nos. Solar light at village Digha	Providing 5 nos. Solar light at village Ramkanali	3
	Budget in Lakhs	1	1	1	
Development and maintenance of existing ponds in the local villages	Physical Target:	Development & maintenance of 2 ponds at villages Gar	Development & maintenance of 2 ponds at villages Digha & Shunuri	Development & maintenance of 2 ponds at villages	15

Need based Activities	Particulars	Year of Implementation			Total Expenditure (Rs. In Lakhs)
		1 st Year	2 nd Year	3 rd Year	
		Panchkot & Ranipur		Haridi & Ramkanali	
	Budget in Lakhs	5	5	5	
Providing green and blue Dustbins in the surrounding villages (under Swachh Bharat Scheme) for waste segregation and handling	Physical Target:	Providing 200 green dustbins and 200 blue dustbins at five villages namely Lachhmanpur, Gagra, Ramkanali, Ranipur, Ajodhya	Providing 200 green dustbins and 200 blue dustbins at five villages namely Malancha, Mahishnadi, Bhurkunrabari, Bathanbari, Haridi	Providing 100 green dustbins and 100 blue dustbins at five villages namely Gar Panchkot, Digha, Kelyasota, Sarbari, Shunuri, Madhukunda	
	Budget in Lakhs	0.4	0.4	0.2	1.0
Total Budget - Need based activities: Rs. 19 Lakhs					
Overall Budget (Public Hearing related + Need based Activities): Rs. 134 Lakhs					

It has been decided to develop one nearby village namely Benipur by adopting the same by addressing the socio-economic needs of the villagers. The budget for this purpose is Rs. 70.2 Lakhs, which will be spent under the following heads:

Targets	Amount in Rs. Lakhs
To take care of local people's health	40
Development of 2 tube wells	2
Construction of 2 Rain Water Harvesting structures	5
Construction of 1 km new road and repairing of existing roads	10
Renovation & repairing of school building	3
Development of playground and library	3
Providing 10 nos. Solar light	2
Development & maintenance of 2 ponds	5
Providing Dustbins	0.2
TOTAL	70.2

Signature Not Verified
Digitally signed by Dr. R. B. Lal
Scientist F
Date: 1/5/2023 4:22:53 PM

SPEED POST

NOC NO172031

WEST BENGAL POLLUTION CONTROL BOARD

Paribesh Bhawan
10A, Block - LA, Sector III, Bidhannagar
Kolkata - 700 106



Memo No. 65 - 2N-19/2020(E)

Dated 07.02.2023

From :
Member Secretary,
West Bengal Pollution Control Board

To: M/s. AIC Iron Industries Private Limited,
25, Ganesh Chandra Avenue, 4th Floor, Kolkata- 700 013.

Sub: Consent to Establish (NOC) from Environmental Point of View

Ref: i) Your letter No. Nil Dated 02.02.2023
ii) Environment Clearance received from MOEF&CC vide EC Identification No. EC23A008WB169186, File No. J-11011/566/2008-IA.II(I) dt. 05.01.2023.

Dear Sirs,

In response to the application for Consent to Establish (NOC) for proposed Unit of M/s AIC Iron Industries Private Limited

for manufacturing/storage/installation 1x400 TPD Sponge Iron Plant (1,32,000 TPA), Steel Melting Shop for total production of 2,60,500 TPA Billets, 1,92,000 TPA Rolling Mill with 1x15 TPD Reheating Furnace and Captive Power Plant - (20MW (10MW WHRB + 10MW AFBC)) for expansion at existing Steel plant at Vill. - Benipur, P.O. - Saltore, P.S. - Neturia, Dist. - Purulia, West Bengal. this is to inform you that this Board hereby grants the Consent to Establish (NOC) from the environmental point of the above subject to the following conditions and special conditions annexed. FIN -723121 for total* land coverage of 10.01Ha.

1. The quality of sewage and trade effluent to be discharged from your factory shall satisfy the permissible limits as prescribed in IS : 2490 (Pt. I) of 1974, and/or its subsequent amendment and Environment (Protection) Rules 1986.
2. Suitable measures to treat your effluent shall be adopted by you in order to reduce the pollutional load so that the quality of the effluent satisfies the standards mentioned above.
3. You shall have to apply to this Board for its consent to operate and discharge of sewage and trade effluent according to the provisions of the water (Prevention & Control of Pollution) Act, 1974. No sewage or trade effluent shall be discharged by you without prior consent of this Board.
4. All emission from your factory shall conform to the standards as laid down by this Board.
5. No emission shall be permitted without prior approval of this Board and you shall apply to this Board for its consent to operate and atmospheric emission as per provision of the Air (Prevention & Control Pollution) act, 1981.
6. No industrial plant, furnace, flues, chimneys, control equipment, etc. shall be constructed/reconstructed/erected/re-erected without prior approval of this Board.

[Signature]
Chief Engineer
W. B. Pollution Control Board
Dept. of Environment, Govt. of W.B.

NOC

NO172031

7. You shall comply with

- (i) Water (Prevention and Control of Pollution) Cess Act, 1977, if applicable.
- (ii) Water (Prevention and Control of Pollution) Cess Act, 1978, if applicable.
- (iii) Environment (Protection) Act, 1986
- (iv) Environment (Protection) Rules, 1986
- (v) Hazardous Wastes (Management and Handling) Rules, 1989 and Amended Rules, 2000
- (vi) Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 and Amended Rules, 2000
- (vii) Manufacture, Use, Import and Storage and Hazardous Micro-Organisms, Genetically Engineered Organisms or Cell Rules, 1989
- (viii) The Public Liability Insurance Act, 1991 and Amended Act, 1992
- (ix) The Public Liability Insurance Rules, 1991 and Amended Rules 1993
- (x) Biomedical Wastes (Management & Handling) Rules, 1998 and Amended Rules 2000 if applicable.
- (xi) Recycled Plastics Manufacture and Usage Rules 1999, if applicable and
- (xii) Ozone Depleting Substances (Regulation & Control) Rules, 2000, if applicable

8. You will have to abide by any other stipulations as may be prescribed by any authority/local bodies/Government Departments etc.

SPECIAL CONDITION :

1. Refer to Annexure attached herewith.
2. Capital Investment including land & building, plant & Machinery (Gross capital Investment) of the unit is Rs.145.00 Crores.

Any violation of the aforesaid conditions shall entail cancellation of this Consent to Establish (NOC)

Yours faithfully,

[Signature]
Member Secretary/Chief Engineer,
West Bengal Pollution Control Board (EIM CELL)
Chief Engineer

Dated: *[Signature]*
W.B. Pollution Control Board
Dept. of Environment, Govt. of W.B.

Memo No. *65*

-2N-19/2020(E) dtd. 07.02.2023

Copy forwarded for information to :

1. Chief Inspector of Factories, Government of West Bengal, N. S. Building, Kolkata-700 001
2. Director of Industries/Director of Cottage & Small Scale Industries, Government of West Bengal, N. S. Building, Kolkata-700 001
3. Guard file, West Bengal Pollution Control Board.
4. Environmental Engineer, I/II/Alipur R.O./Howrah R.O./Hooghly R.O./B.R.O./D.R.O./Haldia R.O./S.R.O./Asansol/ Sub-R.O./WBPC Board

Himalaya Bhawan
Delhi Road, Dankuni
Dist. Hooghly

Vill, Panpur
Kalyani Expressway
P.O. Narayanpur
Dist. 24 Pgs. (N)

Sahid Khudiram Sarani
City Centre, Durgapur-16
Dist. Burdwan

10, Carnac Street
2nd Floor
Kolkata-700 017

Paribesh Bhawan
10A, LA-Block, Sector-III
Salt Lake City,
Kolkata - 700 098

Block-05 at 40
Flats Complex
Adjacent to Priyambada
Housing Estate
P.O. : Khanjanchak,
P.S. Durgachak
Haldia-721602
Dist. : Purba Medinipur

Paribahan Nagar
Matigara, Siliguri
Dist.-Darjeeling

Satya Chowdhury
Indoor Stadium
Balurchar Bandh Road
Malda-732101

Asansol Sub-Regional Office
ADDA Commercial Market (2nd Floor)
Opposite Asansol Fire Station
G.T. Road, Asansol-713 301

[Signature]
Member Secretary/Chief Engineer,
West Bengal Pollution Control Board
Chief Engineer (EIM CELL)
W. B. Pollution Control Board
Dept. of Environment, Govt. of W.B.

Annexure – I to NOC NO172031

Issued to: M/s AIC Iron Industries Private Limited at Village – Benipur, P.O. – Saltore, Police Station - Neturia,
District - Purulia, West Bengal - 723121

OVERALL PROJECT SCENARIO

Name of the Units	Units as per NOC from WBPCB	Units as per EC dated 27.08.2010 *	Units under Operation	Proposed Units	Total Units
Sponge Iron Plant	-	4x100 TPD DRI Kilns (1,20,000 TPA Sponge Iron)	-	1x400 TPD DRI Kiln (1,32,000 TPA Sponge Iron)	1x400 TPD DRI Kiln (1,32,000 TPA Sponge Iron)
Induction Furnaces with matching LRF & CCM	1x3 T + 1x6 T (28,800 TPA Billets) (As per NOC from WBPCB)	2x15 T (1,20,000 TPA Billets)	(1x3 T + 1x6 T) # + (1x15 T) (28,800 TPA + 49,500 TPA= 78,300 TPA Billets)	3x15 T (1,48,500 TPA Liquid Steel) (1,46,000 TPA Billets)	2x10 T & 4x15 T # (2,60,500 TPA Billets)
Rolling Mill	-	-	-	1,92,000 TPA Structural Steels (Angles, Channels, Joist, TMT Bars, Wire Rod, Strips & Pipes etc.) with 1x15 TPH Reheating Furnace.	1,92,000 TPA Structural Steels (Angles, Channels, Joist, TMT Bars, Wire Rod, Strips & Pipes etc.) with 1x15 TPH Reheating Furnace.
Captive Power Plant	-	12 MW CPP (8 MW WHRB + 4 MW AFBC)	-	20 MW CPP (10 MW WHRB + 10 MW AFBC)	20 MW CPP (10 MW WHRB + 10 MW AFBC)

Note:

* EC from MoEF&CC dated 27-8-2010 is not valid. Consent to Establish (NOC) for the same EC was issued by West Bengal Pollution Control Board vide Memo. No. 845-2N-131/2008(E) dated 28.10.2014 which was valid up to 31-10-2019.

Existing (1x3 T+1x6 T) Induction Furnaces will be replaced by 2x10 T Induction Furnaces.

Dinku
07/02/2023
Chief Engineer
W. B. Pollution Control Board
Dept. of Environment, Govt. of W.B.

Annexure – II to NOC NO172031

Issued to: M/s AIC Iron Industries Private Limited at Village – Benipur, P.O. – Saltore, Police Station - Neturia, District
- Purulia, West Bengal - 723121

Sl. No.	Emission Source	Configuration (Proposed)	Emission Control Devices	Stack from G.L.
I. Sponge Iron Plant				
1.	DRI Kiln	1x 400 TPD	ABC, WHRB and ESP for Kiln, ID fan	01 No., 50 m
2.	DRI Kiln Cooler Discharge	1 X400 TPD	Providing De dusting system which will be connected to Bag Filter.	01 No., 30 m
3.	Coal Circuit (Crusher + Injector)	1 Nos.	Bag Filter, ID fan	1 Nos., 30 m
4.	Product House	1 Nos.	Bag Filter, ID fan	1Nos., 30 m
5.	Day Bin/ Transfer House	1 Nos.	Bag Filter, ID fan	1Nos., 30 m
6.	Raw material Stock House with Iron Ore Crusher	1 Nos.	Bag Filter, ID fan	1 Nos., 30 m
II. Steel Melting Shop				
7.	Electric Induction Furnace With Matching LRF, & CCM	(10 T IF x 2)	Separate Hood, Spark Arrestor, I.D Fan & 02 nos. Bag Filters for each	01 no., 30 m
		(15 T IF x 2)	Separate Hood, Spark Arrestor, I.D Fan & 02 nos. Bag Filters	01 no., 30 m
		(15 T IF x 2)	Separate Hood, Spark Arrestor, I.D Fan & 02 nos. Bag Filters	01 no., 30 m

Mukherjee
02/02/2023

Chief Engineer
W. B. Pollution Control Board
Dept. of Environment, Govt. of W.B.

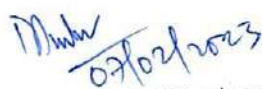
III. Rolling Mill				
8.	Rolling Mill (0.192 MTPA) & Reheating Furnace (15 TPH)	1 Nos	ID Fan & Bag Filter	30 m
IV. Captive Power Plant				
9.	WHRB Based	10 MW WHRB Based (40 TPH Boiler connected with 1 X 400 TPD Kiln)	ESP	50m, (Commonly connected with Kiln stack)
10.	AFBC (Coal & Dolochar Mix based)	10 MW AFBC (Coal & Dolochar Mix Based, 50 TPH Boiler)	E.S.P. with Pneumatic Ash Conveying System, Silo and Pug Mill	50 m
V. D.G. Set				
11.	D.G. Set	2 x 1010 KVA	Exhaust Muffler & Acoustic Enclosure	10.5 m

A) Emission:

- I. The DG sets and Boilers shall be equipped with suitable pollution control devices and the adequate stack height so that the emissions are in conformity with the extant regulations and the guidelines in this regard.
- II. Storage of raw materials, coal etc. shall be either stored in silos or in covered areas to prevent dust pollution and other fugitive emissions.
- III. National Emission Standards for Organic Chemicals Manufacturing Industry issued by the Ministry vide G.S.R.608(E) dated 21st July, 2010 and amended from time to time shall be followed.
- IV. The National Ambient Air Quality Emission Standards issued by the Ministry vide G.S.R.No.826 (E) dated 16th November, 2009 shall be complied with.

B) Effluent :

- I. Process – To be treated in effluent treatment plant (ETP). Zero liquid discharge to be ensured as committed.
- II. Domestic – To be treated in integrated waste water treatment plant (STP). Treated effluent to be reused.


 Chief Engineer
 W. B. Pollution Control Board
 Dept. of Environment, Govt. of W.B.

C) Solid Waste & Hazardous Waste:

- I. The PP should comply with the provisions of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 or any amendments thereafter.
- II. Hazardous chemicals shall be stored in tanks, tank farms, drums, carboys etc. Flame arresters shall be provided on tank farm and the solvent transfer through pumps.
- III. Process organic residue and spent carbon, if any, shall be sent to cement industries. ETP sludge, process inorganic & evaporation salt shall be disposed off to the TSDF.
- IV. Municipal solid wastes to be disposed off as per the Solid Waste Management Rules, 2016.

D) General:

- I. Noise Control – Ambient noise & D.G. Set noise level not to exceed the permissible limit.
- II. The standards / guidelines for control of noise from stationary Diesel generator sets prescribed under notification of Ministry of Environment & Forest, Govt. of India, G.S.R.371(E), [17/5/2002] and its amendments should be followed.
- III. Water bodies exist within the project site should not be disturbed.
- IV. Action to be taken to control fugitive emission.
- V. Fire License to be obtained from competent authority.
- VI. The unit should obtain authorization from this Board under the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.
- VII. Good housekeeping to be maintained.
- VIII. No expansion / modification to be carried out without permission from this Board.
- IX. The unit should obtain Consent-to- Operate for the proposed project from the State Board before starting manufacturing activities.
- X. Statutory clearance/license from competent authorities, as applicable to be obtained.
- XI. All conditions laid down in the Environmental Clearance obtained for the project from MoEF & CC, GoI, vide EC Identification No. – EC23A008WB169186 File No. – J-I-11011/566/2008-IA.II(I) dated 05/01/2023 be strictly complied with.
- XII. This 'Consent to Establish' is valid up to **28.02.2030** for setting up the unit.


07 April 2023
Chief Engineer
W. B. Pollution Control Board
Dept. of Environment, Govt. of W.B.

WEST BENGAL POLLUTION CONTROL BOARD

'Paribesh Bhawan'

Bldg. No. - 10A, Block - LA, Sector-III

Salt Lake City, Kolkata-700 098

C0134656



Consent Letter Number :

Memo Number : 194 - WPPCB/Red/Pst/Cont/216/07

Date : 4.5.2023

Consent to Operate

under

Section 25 & 26 of the Water (Prevention and Control of Pollution) Act, 1974 and
Section 21 of the Air (Prevention and Control of Pollution) Act, 1981

The West Bengal Pollution Control Board (hereinafter referred to as State Board) under the provisions of Section 25 & 26 of the Water (Prevention and Control of Pollution) Act, 1974, as amended and Section 21 of the Air (Prevention and Control of Pollution) Act, 1981, as amended and Rules and Orders made thereunder, hereby grants its consent to :

M/S- AIC Iron Industries Pvt. Ltd.
.....
..... (Address of Regd. office/Head/Office/City Office)

(hereinafter referred to as Applicant) for its unit located at Vill- Benipur, PO - Saltore,
P.S- Neturia, Dist- Purulia, Pin- 723121

..... (Detailed address of the manufacturing unit)
for a period from Date of issue to 31/03/2028.

to operate the industrial unit and to discharge liquid effluent and to emit gaseous effluent from the premises/land of the industrial unit, in accordance with the conditions as mentioned in the Annexure to this consent letter provided on any day at any instance the quantity and quality of liquid discharge and gaseous emission shall not exceed the permissible limit as specified in the Table I & II of this consent letter and in the Environmental (Protection) Act, 1986.

Breach of the conditions and / or failure to comply with the directions as set out in the Annexure shall render the applicant liable for prosecution under the provisions of the Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention and Control of Pollution) Act, 1981.

The State Board reserve the right to revoke, withdraw or make any reasonable variation / change / alter the conditions of this consent letter giving one month's notice to the applicant.



For and on behalf of the State Board

(Member Secretary/Chief Engr./ Sr. Env. Engr. / Env. Engr. / Asst. Env. Engr.)

(2)

ANNEXURE

Consent to M/s. AIC Iron Industries Pvt. Ltd.
for its unit at Vill - Benipur, PO - Saltore, PS - Nehuria, Purulia - 723121

Conditions :

01. This Consent is valid for the manufacture of :-

Sl. No.	Name of major products and by-products	Quantity manufactured per month
01	M.S M.S Billets	6150 tons
02	strips & Pipes	2000 Tons.
03	Iron particles	25 tons.
04		
05		
06		
07		
08		
09		
10		
11		
12		

02. The Applicant shall remain responsible for quantity and quality of liquid effluent and air emissions.
03. Daily discharge of industrial liquid effluent shall not exceed recycled KL.
04. Daily discharge of domestic liquid effluent shall not exceed 2.0 KL.
05. Daily discharge of mixed (industrial & domestic) liquid effluent shall not exceed — KL.
06. The Applicant shall discharge liquid effluent to septic tank to soak pit (place of discharge)
through one nos. outlets / outfalls.
07. To bring into any altered or new outlet/outfall or to change the place of discharge, the Applicant shall have to inform the Board and obtain prior permission of the Board in this effect.
08. The Applicant shall provide comprehensive facility for treatment of industrial liquid waste and domestic liquid waste (sewage, sullage and liquid effluent generated from canteen), and operate and maintain the same continuously so that the quality of final effluent conforms to the Standard as given in Table-I in page 03.

(Member Secretary/Chief Engr./ Sr. Env. Engr. / Env. Engr. / Asst. Env. Engr.)

Continued.....

Consent to M/s- AIC Iron Industries Pvt. Ltd.⁽³⁾
for its unit at Vill- Benipur, PO- Saltoe, PS- Nefuria, Purulia- 723121

Table-I

[illegible]

09. The *Applicant* falls in theCategory of the Water (Prevention and Control of Pollution) Cess Act, 1977 and Rules made thereunder and the Applicant shall comply with the provisions of the said Act and Rules made thereunder.
10. **Daily** water consumption for the following purposes should not exceed :-
- Industrial cooling, spraying in mine pits and boiler feed water →12.0.....KL
(Water used for gardening should be included in this category of use)
 - Domestic purpose →5.0.....KL
 - Processing whereby water gets polluted and the pollutants are easily biodegradable →—.....KL
 - Processing whereby water gets polluted and the pollutants are not easily biodegradable →—.....KL

The *Applicant* shall regularly submit to the Board the Returns of Water Consumption in the prescribed form and pay the Cess as specified under Section 3 of the said Act.

(Member Secretary/Chief Engr./ Sr. Env. Engr. / Env. Engr. / Asst. Env. Engr.)

Continued.....

(4)

Consent to M/s- AIC Iron Industries Pvt. Ltd.
 for its unit at Vill- Benipur, PO- Saltore, PS- Nekuria, Puruliya-72312

11. The *Applicant* shall install suitable device for measuring the volume of water consumed for different purposes as mentioned above giving correct result to the satisfaction of the *State Board*.
12. All the stacks connected to various sources of emissions must be designated by numbers such as S-1, S-2, S-3, etc., and this must be painted/displayed to facilitate identification.
13. The *Applicant* shall install comprehensive control system consisting of pollution control equipment as is warranted with reference to generation of air emissions and operate and maintain the same continuously so as to achieve the level of pollutants of the *Standard* as given in Table-II below :

Table-II

Stack No.	Stack height from G.L., (in mts.)	Stack attached to (sources and control system, if any):	Volume Nm ³ /hr.	Velocity of gas emission m/sec	Concentrations of parameters not to exceed				Frequency of emission sampling
					SPM (mg/Nm ³)	CO (%v/v)			
S-I	30.0	Common stack for all 3 IF, of (3 MT/heat, 6 MT/heat, 15 MT/heat			50				
S-2					PM limits to be maintained as per EC conditions stipulated.				
S-3									
S-4									
S-5									
S-6									
S-7									
S-8									
S-9									
S-10									

(Member Secretary/Chief Engr./ Sr. Env. Engr. / Env. Engr. / Asst. Env. Engr.)

Continued.....

(5)

Consent to M/s- AIC Iron Industries Pvt. Ltd.
 for its unit at Vill - Benipur, PO - Saltore, PS - Neturia, Purulia - 723121

14. The Applicant shall provide ports in the stack(s) and other necessary permanent facilities such as ladder, platform, etc. for monitoring/sampling the air emissions and the same shall be made available for inspection and use by the State Board's staff as well as State Board's authorised agencies.

15. The Applicant shall observe the following fuel consumption pattern :-

Sl. No	Type of fuel	Quantity consumed per day	Fuel burning operation where the fuel is used
01	Electricity	-	Induction furnace 1, 2 & 3
02			
03			
04			
05			

16. The Applicant shall maintain the generation and treatment/disposal of non-hazardous solid waste as specified below :-

Type of waste	Quantity	Treatment	Disposal
Slag	140 tons/month	-	low land filling
M.S Billets cuts	200 tons/month	-	Reuse

17. The Applicant shall take adequate measures for control of noise levels from its own sources within the premises within the limit given below :-

Time	Limit in dB(A) L_{eq}
Day Time (06 a.m. to 09 p.m.)	65
Night Time (09 p.m. to 06 a.m.)	55

18. The Applicant shall at all times maintain good house-keeping, proper working order, and operate efficiently for control of pollution from all sources so as not to cause nuisance to surrounding areas/inhabitants and to achieve compliance with the terms and conditions of the consent.

19. The Applicant shall bring about at least 33% of the available open land under the green coverage / plantation.

20. The Applicant shall provide for an alternate electric power source sufficient to operate all pollution control facilities installed by the Applicant to maintain compliance with the terms and conditions of the consent. In absence of such an alternate electric power source, the Applicant shall stop, reduce or otherwise control production to abide by the terms and conditions of the Consent regarding pollution level.

21. The Applicant shall install a separate energy meter showing the consumption of energy for operation of pollution control devices.

22. The Applicant shall ensure that fugitive emissions from the activity are controlled so as to maintain clean and safe environment in and around the factory premises.

23. The Applicant shall provide drainage system for conveying industrial and domestic liquid waste. Storm-water drain shall be kept separate from the drainage system meant for industrial and domestic liquid waste

(Member Secretary/Chief Engr./ Sr. Env. Engr. / Env. Engr. / Asst. Env. Engr.)

Continued.....

Application No. 3846583
WEST BENGAL POLLUTION CONTROL BOARD

'Paribesh Bhawan'
Bldg. No. - 10A, Block - LA, Sector-III
Salt Lake City, Kolkata-700 098
"Expansion"



Consent Letter Number : COI44084

Memo Number : 724-WPBA/Red (Pol)/Cont(216)/07

Date : 07/12/2023.

Consent to Operate

under

Section 25 & 26 of the Water (Prevention and Control of Pollution) Act, 1974 and
Section 21 of the Air (Prevention and Control of Pollution) Act, 1981

The West Bengal Pollution Control Board (hereinafter referred to as State Board) under the provisions of Section 25 & 26 of the Water (Prevention and Control of Pollution) Act, 1974, as amended and Section 21 of the Air (Prevention and Control of Pollution) Act, 1981, as amended and Rules and Orders made thereunder, hereby grants its consent to :

M/s. AIC Iron Industries Pvt. Ltd.

(Address of Regd. office/Head/Office/City Office)

(hereinafter referred to as Applicant) for its unit located at Vill - Benipur, P.O. - Saltore,

P.S. - Netunia, Dist. - Purulia, Pin - 723121

(Detailed address of the manufacturing unit)

for a period from Date of issue to 31/03/2028

to operate the industrial unit and to discharge liquid effluent and to emit gaseous effluent from the premises/land of the industrial unit, in accordance with the conditions as mentioned in the Annexure to this consent letter provided on any day at any instance the quantity and quality of liquid discharge and gaseous emission shall not exceed the permissible limit as specified in the Table I & II of this consent letter and in the Environmental (Protection) Act, 1986.

Breach of the conditions and / or failure to comply with the directions as set out in the Annexure shall render the applicant liable for prosecution under the provisions of the Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention and Control of Pollution) Act, 1981.

The State Board reserve the right to revoke, withdraw or make any reasonable variation / change / alter the conditions of this consent letter giving one month's notice to the applicant.



For and on behalf of the State Board

Reshma 07/12/2023

(Member Secretary/Chief Engr./Sr. Env. Engr./Env. Engr./Asst. Env. Engr.)

Sr. Environmental Engineer
W. B. Pollution Control Board
Operation & Execution Cell

ANNEXURE

Consent to M/s. AIC Iron Industries Pvt. Ltd.
 for its unit at Vill.- Beripur, P.O.- Saltore, P.S.- Neturia, Dist.- Purulia,
Pin-723121

Conditions :

01. This Consent is valid for the manufacture of :-

Sl. No.	Name of major products and by-products	Quantity manufactured per month
01	<u>M. S. Billets</u>	<u>3750 Ton/Month.</u>
02		
03		
04		
05		
06		
07		
08		
09		
10		
11		
12		

02. The *Applicant* shall remain responsible for quantity and quality of liquid effluent and air emissions.
03. **Daily** discharge of industrial liquid effluent shall not exceed KL.
04. **Daily** discharge of domestic liquid effluent shall not exceed 1.0 KL.
05. **Daily** discharge of mixed (industrial & domestic) liquid effluent shall not exceed KL.
06. The *Applicant* shall discharge liquid effluent to Septic tank/ Soakpit (place of discharge)
 through 01 (one) nos. outlets / outfalls.
07. To bring into any altered or new outlet/outfall or to change the place of discharge, the *Applicant* shall have to inform the Board and obtain prior permission of the Board in this effect.
08. The *Applicant* shall provide comprehensive facility for treatment of industrial liquid waste and domestic liquid waste (sewage, sullage and liquid effluent generated from canteen), and operate and maintain the same continuously so that the quality of final effluent conforms to the *Standard* as given in Table-I in page 03.

R. Sinha 07/12/2023

(Member Secretary/Chief Engr./ Sr. Env. Engr. / Env. Engr. / Asst. Env. Engr.)

Sr. Environmental Engineer
 W. B. Pollution Control Board
 Operation & Execution Cell

Continued.....

(3)

for its unit at Vill. - Benipur, P.O. - Saltore, P.S. - Neturia, Dist. - Purulia,
Pin - 723121

Table-I

[illegible]

10. **Daily water consumption** for the following purposes should not exceed :-

- | | | | |
|--|---|-----|----|
| ● Industrial cooling, spraying in mine pits and boiler feed water
(Water used for gardening should be included in this category of use) | → | 6.0 | KL |
| ● Domestic purpose | → | 2.0 | KL |
| ● Processing whereby water gets polluted and the pollutants
are easily biodegradable | → | — | KL |
| ● Processing whereby water gets polluted and the pollutants
are not easily biodegradable | → | — | KL |

The *Applicant* shall regularly submit to the Board the Returns of Water Consumption in the prescribed form and pay the Cess as specified under Section 3 of the said Act.

Rosalia 07/12/2023

(~~Member Secretary/Chief Engr./ Sr. Env. Engr. / Env. Engr. / Asst. Env. Engr.~~)

Sr. Environmental Engineer
W. B. Pollution Control Board
Operation & Execution Cell

Continued.....

Consent to M/s. AIC Iron Industries Pvt. Ltd.
 for its unit at Vill.- Benipur, P.O.- Saltone, P.S.- Netunia, Dist.- Purulia,
Pin-723121.

11. The *Applicant* shall install suitable device for measuring the volume of water consumed for different purposes as mentioned above giving correct result to the satisfaction of the *State Board*.
12. All the stacks connected to various sources of emissions must be designated by numbers such as S-1, S-2, S-3, etc., and this must be painted/displayed to facilitate identification.
13. The *Applicant* shall install comprehensive control system consisting of pollution control equipment as is warranted with reference to generation of air emissions and operate and maintain the same continuously so as to achieve the level of pollutants of the *Standard* as given in Table-II below :

Table-II

Stack No.	Stack height from G.I., (in mts.)	Stack attached to (sources and control system, if any):	Volume Nm ³ /hr.	Velocity of gas emission m/sec	Concentrations of parameters not to exceed				Frequency of emission sampling
					SPM (mg/Nm ³)	CO (%v/v)			
S-1	30 (Common with existing I.F.S.)	Induction Furnace (01 no.) (15 MT/heat) with Bag Filter.			30	1			Quarterly
S-2									
S-3									
S-4									
S-5									
S-6									
S-7									
S-8									
S-9									
S-10									

Reluha 07/12/2023
 (Member Secretary/Chief Engr./ Sr. Env. Engr. / Env. Engr. / Asst. Env. Engr.)

Sr. Environmental Engineer
 W. B. Pollution Control Board
 Operation & Execution Cell

Continued.....

C0144084

(5)

Consent to M/s. AIC Iron Industries Pvt. Ltd.for its unit at Vill.- Benipur, P.O.- Saltone, P.S.- Natarua, Dist.- Purulia,Pin-723121

14. The *Applicant* shall provide ports in the stack(s) and other necessary permanent facilities such as ladder, platform, etc. for monitoring/sampling the air emissions and the same shall be made available for inspection and use by the *State Board's* staff as well as *State Board's* authorised agencies.

15. The *Applicant* shall observe the following fuel consumption pattern :-

Sl. No	Type of fuel	Quantity consumed per day	Fuel burning operation where the fuel is used
01	Electricity	—	Furnace
02			
03			
04			
05			

16. The *Applicant* shall maintain the generation and treatment/disposal of non-hazardous solid waste as specified below :-

Type of waste	Quantity	Treatment	Disposal
Slag	255 Ton/month	—	Land Filling

17. The *Applicant* shall take adequate measures for control of noise levels from its own sources within the premises within the limit given below :-

Time	Limit in dB(A) L_{eq}
Day Time (06 a.m. to 09 p.m.)	65
Night Time (09 p.m. to 06 a.m.)	55

18. The *Applicant* shall at all times maintain good house-keeping, proper working order, and operate efficiently for control of pollution from all sources so as not to cause nuisance to surrounding areas/inhabitants and to achieve compliance with the terms and conditions of the consent.

19. The *Applicant* shall bring about at least 33% of the available open land under the green coverage / plantation.

20. The *Applicant* shall provide for an alternate electric power source sufficient to operate all pollution control facilities installed by the *Applicant* to maintain compliance with the terms and conditions of the consent. In absence of such an alternate electric power source, the *Applicant* shall stop, reduce or otherwise control production to abide by the terms and conditions of the Consent regarding pollution level.

21. The *Applicant* shall install a separate energy meter showing the consumption of energy for operation of pollution control devices.

22. The *Applicant* shall ensure that fugitive emissions from the activity are controlled so as to maintain clean and safe environment in and around the factory premises.

23. The *Applicant* shall provide drainage system for conveying industrial and domestic liquid waste. Storm-water drain shall be kept separate from the drainage system meant for industrial and domestic liquid waste

(Member Secretary/Chief Engr./ Sr. Env. Engr. / Env. Engr. / Asst. Env. Engr.)

Rishi 07/12/2023
Sr. Environmental Engineer
W. B. Pollution Control Board
Operation & Execution Cell

Continued.....

Consent to M/s. AIC Iron Industries Pvt. Ltd.
 for its unit at Vill- Benipur, P.O.-Saltore, P.S.-Neturia, Dist.-Purulia,
Pin-723121.

24. The *Applicant* shall maintain a separate register showing consumption of chemicals used in pollution control systems.
25. The *Applicant* shall get the samples of hazardous wastes/leachates analysed at least once in from the laboratory recognised of the West Bengal Pollution Control Board and ensure that they conform to the limits stipulated. Test reports shall be sent to the Board.
26. The *Applicant* shall provide adequate and safe facility for collection of air, waste water and solid waste samples by the *State Board's* staff as well as *State Board's* authorised agencies.
27. The *Applicant* shall submit to the *State Board* by the 30th September of every year the Environmental Statement Report for the financial year ending 31st March of the current year in the prescribed form (Form -V) as required under the provisions of rule 14 of the Environment (Protection) [Second Amendment] rules, 1992.
28. The *Applicant* shall allow the Officers of the *State Board* to enter into the applicant's premises at any reasonable time to inspect the pollution control systems as well as monitoring and measuring devices in connection with prevention & control of pollution.
29. The *Applicant* shall maintain an Inspection Book in the factory premises which shall be made available to Officers & employees of the *State Board* for inspection, review and to write down any direction or observation as is deemed necessary during the inspection from time to time.
30. The *Application* shall furnish to the *State Board* all information in respect of quality, quantity, rate of discharge, place of discharge of liquid effluent and air emissions.
31. The *Applicant* shall maintain adequate number of qualified and trained personnel among his staff for proper maintenance and operation of the effluent treatment and / or emission control devices and for overall environment management of the industry.
32. The *Applicant* shall have to make registration for the use of groundwater if any, with Central Ground Water Authority.
33. The *Applicant* shall intimate to the *State Board* immediately of any occurrence or apprehension of occurrence of discharge of any poisonous, noxious or pollutants in excess of quality as well as quality as mentioned earlier to any receiving water body/receiving system or to atmosphere owing to accident or other unforeseen incident/event including natural disaster. The *Applicant* Shall (i) take all steps adequate to prevent such accident discharge/release of poisonous, noxious or pollutants and to limit their consequences to persons and the environment, (ii) provide to the persons working on the site with the information, training and equipment including antidotes necessary to ensure their safety and mitigate the accidental release of poisonous noxious or pollutants to the environment.
34. The *Applicant* shall make an application to the *State Board* in the prescribed form for renewal of the consent at least 120 (sixty) days before the date of expiry of this Consent.
35. The *Applicant* shall not make any alternation/modification/expansion in the existing manufacturing process and equipment as well as the pollution control system without prior approval of the Board.
36. The *Applicant* shall comply with the conditions as laid down in the Manufacture, Storage and Import of hazardous Chemicals Rules, 1989 and Hazardous Wastes (Management & Handling) Rules, 1989.

Additional Conditions

1. The unit shall operate in compliance with the conditions imposed in the EC dt. 05/01/2023 and NOC dt. 07/02/2023.
2. Adequate plantation as per EC & NOC condition shall be done.

(Member Secretary/Chief Engr./ Sr. Env. Engr./ Env. Engr./ Asst. Engr.)

Patil
 07/12/2023
 W. B. Pollution Control Board
 Operation & Execution Cell

Application No. 4176258
WEST BENGAL POLLUTION CONTROL BOARD

'Paribesh Bhawan'
Bldg. No. - 10A, Block - LA, Sector-III
Salt Lake City, Kolkata-700 098



Consent Letter Number : CO144092

Memo Number : 740 - WPBA/Red(Pol)/Cont (216)/07

Date : 12/12/2023

Consent to Operate

under

Section 25 & 26 of the **Water (Prevention and Control of Pollution) Act, 1974** and
Section 21 of the **Air (Prevention and Control of Pollution) Act, 1981**

The West Bengal Pollution Control Board (hereinafter referred to as State Board) under the provisions of Section 25 & 26 of the Water (Prevention and Control of Pollution) Act, 1974, as amended and Section 21 of the Air (Prevention and Control of Pollution) Act, 1981, as amended and Rules and Orders made thereunder, hereby grants its consent to :

M/s. AIC Iron Industries Pvt. Ltd.

(Address of Regd. office/Head/Office/City Office)

(hereinafter referred to as Applicant) for its unit located at Vill. - Benipur, PO. - Saltone, P.S. - Neturia,
Dist. - Purulia, Pin - 723121

(Detailed address of the manufacturing unit)

for a period from Date of issue to 31/03/2028

to operate the industrial unit and to discharge liquid effluent and to emit gaseous effluent from the premises/land of the industrial unit, in accordance with the conditions as mentioned in the Annexure to this consent letter provided on any day at any instance the quantity and quality of liquid discharge and gaseous emission shall not exceed the permissible limit as specified in the Table I & II of this consent letter and in the Environmental (Protection) Act, 1986.

Breach of the conditions and / or failure to comply with the directions as set out in the Annexure shall render the applicant liable for prosecution under the provisions of the Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention and Control of Pollution) Act, 1981.

The State Board reserve the right to revoke, withdraw or make any reasonable variation / change / alter the conditions of this consent letter giving one month's notice to the applicant.



For and on behalf of the State Board

Ratna 12/12/2023
(Member Secretary/Chief Engr./ Sr. Env. Engr. / Env. Engr. / Asst. Env. Engr.)

Sr. Environmental Engineer
W. B. Pollution Control Board
Operation & Execution Cell

ANNEXURE

Consent to M/s. AIC Iron Industries Pvt. Ltd.for its unit at Vill.- Benipur, P.O.-Saltore, P.S.-Neturia, Dist.-Purulia,
Pin-723121.**Conditions :**

01. This Consent is valid for the manufacture of :-

Sl. No.	Name of major products and by-products	Quantity manufactured per month
01	<u>Sponge Iron</u>	<u>11000 Ton/Month</u>
02	<u>Captive Power (WHRB of 33TPH)</u>	<u>10 MW</u>
03		
04		
05		
06		
07		
08		
09		
10		
11		
12		

02. The Applicant shall remain responsible for quantity and quality of liquid effluent and air emissions.

03. Daily discharge of industrial liquid effluent shall not exceed KL.

04. Daily discharge of domestic liquid effluent shall not exceed 05 KL.

05. Daily discharge of mixed (industrial & domestic) liquid effluent shall not exceed KL.

06. The Applicant shall discharge liquid effluent to Septic Tank/ Soakpit (place of discharge)
through 01 (one) nos. outlets / outfalls.

07. To bring into any altered or new outlet/outfall or to change the place of discharge, the Applicant shall have to inform the Board and obtain prior permission of the Board in this effect.

08. The Applicant shall provide comprehensive facility for treatment of industrial liquid waste and domestic liquid waste (sewage, sullage and liquid effluent generated from canteen), and operate and maintain the same continuously so that the quality of final effluent conforms to the Standard as given in Table-I in page 03.

Rishu 12/12/2023
(Member Secretary/Chief Engr./ Sr. Env. Engr. / Env. Engr. / Asst. Env. Engr.)

Sr. Environmental Engineer
W. B. Pollution Control Board
Operation & Execution Cell

Continued.....

(3)

Table-I

Sr. Environmental Engineer
W. B. Pollution Control Board
Operation & Execution Cell

Consent to M/S. ADC Iron Industries Pvt. Ltd.

for its unit at Vill.-Benipur, P.O.-Saltone, P.S.-Netunia, Dist.-Purulia,
Pin-723121

11. The *Applicant* shall install suitable device for measuring the volume of water consumed for different purposes as mentioned above giving correct result to the satisfaction of the *State Board*.
12. All the stacks connected to various sources of emissions must be designated by numbers such as S-1, S-2, S-3, etc., and this must be painted/displayed to facilitate identification.
13. The *Applicant* shall install comprehensive control system consisting of pollution control equipment as is warranted with reference to generation of air emissions and operate and maintain the same continuously so as to achieve the level of pollutants of the *Standard* as given in Table-II below :

Table-II

Stack No.	Stack height from G.L., (in mts.)	Stack attached to (sources and control system, if any):	Volume Nm ³ /hr.	Velocity of gas emission m/sec	Concentrations of parameters not to exceed					Frequency of emission sampling
					SPM (mg/Nm ³)	CO (%v/v)				
S-1	72	01 X 400 TPD DRI Kiln (ESA)			30					Quarterly
S-2	30	Coal Circuit - (Bag Filter)			30					Quarterly
S-3	30	Raw Material Stock House - Bag Filter			30					Quarterly
S-4	30	Day Bin - Bag Filter			30					Quarterly
S-5	30	Product House - Bag Filter			30					Quarterly
S-6	30	Cooler Discharge - Bag Filter			30					Quarterly
S-7										
S-8										
S-9										
S-10										

Online stack monitoring system for the DRI Stack to be installed within three months.

Adisha
12/12/2023

(Member Secretary/Chief Engr./ Sr. Env. Engr. / Env. Engr. / Asst. Env. Engr.)

Sr. Environmental Engineer
W. B. Pollution Control Board
Operation & Execution Cell

Continued.....

Consent to MLS. AIC Iron Industries Pvt. Ltd.
 for its unit at Vill.- Benipur, P.O.- Saltore, P.S.- Netunia, Dist.- Purulia,
Pin- 723121

14. The *Applicant* shall provide ports in the stack(s) and other necessary permanent facilities such as ladder, platform, etc. for monitoring/sampling the air emissions and the same shall be made available for inspection and use by the *State Board's* staff as well as *State Board's* authorised agencies.
15. The *Applicant* shall observe the following fuel consumption pattern :-

Sl. No	Type of fuel	Quantity consumed per day	Fuel burning operation where the fuel is used
01			
02			
03			
04			
05			

16. The *Applicant* shall maintain the generation and treatment/disposal of non-hazardous solid waste as specified below :-

Type of waste	Quantity	Treatment	Disposal
Dolochar	25000 Ton/Month	Consumed by Power Generating unit RAIC/	
Slag	300 Ton/Month	Sold out to other Power Producing units,	Land Filling

17. The *Applicant* shall take adequate measures for control of noise levels from its own sources within the premises within the limit given below :-

Time	Limit in dB(A) L_{eq}
Day Time (06 a.m. to 09 p.m.)	65
Night Time (09 p.m. to 06 a.m.)	55

18. The *Applicant* shall at all times maintain good house-keeping, proper working order, and operate efficiently for control of pollution from all sources so as not to cause nuisance to surrounding areas/inhabitants and to achieve compliance with the terms and conditions of the consent.
19. The *Applicant* shall bring about at least 33% of the available open land under the green coverage / plantation.
20. The *Applicant* shall provide for an alternate electric power source sufficient to operate all pollution control facilities installed by the *Applicant* to maintain compliance with the terms and conditions of the consent. In absence of such an alternate electric power source, the *Applicant* shall stop, reduce or otherwise control production to abide by the terms and conditions of the Consent regarding pollution level.
21. The *Applicant* shall install a separate energy meter showing the consumption of energy for operation of pollution control devices.
22. The *Applicant* shall ensure that fugitive emissions from the activity are controlled so as to maintain clean and safe environment in and around the factory premises.
23. The *Applicant* shall provide drainage system for conveying industrial and domestic liquid waste. Storm-water drain shall be kept separate from the drainage system meant for industrial and domestic liquid waste

Resha 12/12/2023
 (Member Secretary/Chief Engr./ Sr. Env. Engr. / Env. Engr. / Asst. Env. Engr.)

Sr. Environmental Engineer Continued.....
 W. B. Pollution Control Board
 Operation & Execution Cell

Consent to MLS AIC Inon Industries Pvt. Ltd.

for its unit at Vill.-Benipur, P.O.-Saltore, P.S.-Netunia, Dist.-Purulia,
Pin-723121.

24. The *Applicant* shall maintain a separate register showing consumption of chemicals used in pollution control systems.
25. The *Applicant* shall get the samples of hazardous wastes/leachates analysed at least once in from the laboratory recognised of the West Bengal Pollution Control Board and ensure that they conform to the limits stipulated. Test reports shall be sent to the Board.
26. The *Applicant* shall provide adequate and safe facility for collection of air, waste water and solid waste samples by the *State Board's* staff as well as *State Board's* authorised agencies.
27. The *Applicant* shall submit to the *State Board* by the 30th September of every year the Environmental Statement Report for the financial year ending 31st March of the current year in the prescribed form (Form -V) as required under the provisions of rule 14 of the Environment (Protection) [Second Amendment] rules, 1992.
28. The *Applicant* shall allow the Officers of the *State Board* to enter into the applicant's premises at any reasonable time to inspect the pollution control systems as well as monitoring and measuring devices in connection with prevention & control of pollution.
29. The *Applicant* shall maintain an Inspection Book in the factory premises which shall be made available to Officers & employees of the *State Board* for inspection, review and to write down any direction or observation as is deemed necessary during the inspection from time to time.
30. The *Application* shall furnish to the *State Board* all information in respect of quality, quantity, rate of discharge, place of discharge of liquid effluent and air emissions.
31. The *Applicant* shall maintain adequate number of qualified and trained personnel among his staff for proper maintenance and operation of the effluent treatment and / or emission control devices and for overall environment management of the industry.
32. The *Applicant* shall have to make registration for the use of groundwater if any, with Central Ground Water Authority.
33. The *Applicant* shall intimate to the *State Board* immediately of any occurrence or apprehension of occurrence of discharge of any poisonous, noxious or pollutants in excess of quality as well as quality as mentioned earlier to any receiving water body/receiving system or to atmosphere owing to accident or other unforeseen incident/event including natural disaster. The *Applicant* Shall (i) take all steps adequate to prevent such accident discharge/release of poisonous, noxious or pollutants and to limit their consequences to persons and the environment, (ii) provide to the persons working on the site with the information, training and equipment including antidotes necessary to ensure their safety and mitigate the accidental release of poisonous noxious or pollutants to the environment.
34. The *Applicant* shall make an application to the *State Board* in the prescribed form for renewal of the consent at least 120 ~~60~~ (sixty) days before the date of expiry of this Consent.
35. The *Applicant* shall not make any alternation/modification/expansion in the existing manufacturing process and equipment as well as the pollution control system without prior approval of the Board.
36. The *Applicant* shall comply with the conditions as laid down in the Manufacture, Storage and Import of hazardous Chemicals Rules, 1989 and Hazardous Wastes (Management & Handling) Rules, 1989.

Additional Conditions

The unit shall strictly adhere to
the conditions imposed in the EC
dt. 04/01/2023 and NOC dt 07/02/2023;

(Member Secretary/Chief Engr./ Sr. Env. Engr./ Env. Engr./ Asst. Env. Engr.)

12/12/2023
Sr. Environmental Engineer
W. B. Pollution Control Board
Operation & Execution Cell



MD/DVRR/W-6(144)/2020/ 145/- 56

Date: 07.01.2021

To

The Director,
M/S AIC Iron Industries Private Ltd.,
At- Benipur, P.O. Saltore,
Dist- Purulia (West Bengal),
PIN- 723121

Sub -: Concurrence for drawal of 0.212 MGD of water from Utla River d/s of Maithon and Panchet reservoirs to M/S Iron Industries Private Limited, Purulia.

Ref -: i. Your Application no. Nil / dated 09-07-2020.

ii. WBIDC letter No. WBIDC/DVRRRC/08-09/3010 dated 04.12.2020.

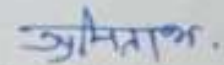
Sir,

With reference to your letter mentioned above vide which a request was made for allocation of water to your firm to draw from Utla river d/s of Maithon and Panchet reservoirs. The discussions were held in 143rd meeting of DVRR Committee on 18-12-2020, concurrence of the DVRRRC for drawl of 0.212 MGD raw water from Utla river d/s of Maithon and Panchet reservoirs is hereby conveyed to your firm. The allocation is subject to following:

- (A) Exact location for drawl of water may be decided in consultation with DVC. The water shall be drawn from the reservoir/ river as and when available and intake structure/ conveyance system should be designed accordingly. As water in the reservoir /river may not be available during certain days in the year particularly during summer months, your firm may have to make arrangement for captive storage to meet water requirement of your firm in such situations.
- (B) Adequate care should be taken in design and construction of the intake structure to ensure availability of water even during summer months. The intake structure should be able to withstand the high levels in river.
- (C) The sourcing point and concurrence for water drawl is project specific. The water drawn shall, in no way be utilized by your firm for any other purpose.

- (D) Your firm will have to ensure that the effluent water discharging out of your plant conforms to the latest regulations /prescribed water quality parameters. On this aspect, DVC will also conduct checks regularly.
- (E) You shall have to execute an agreement with DVC and pay charges to DVC for the water drawn as per the terms and conditions in force. The allocation will come into effect from the day of execution of the agreement with DVC. The allocation of water will be treated as cancelled if your office does not apply to DVC for making agreement for drawl of water within a period of 3 (three) months from the date of issue of this letter.
- (F) Drawl of water should start within 24 months from the date of issue of this letter. In case of non drawl after lapse of 24 months from the date of issue of this letter, the allocation shall deem cancelled and the firm shall have to apply a fresh for revalidation of allocation.

Yours faithfully,



(Amitabh Prabhakar)

Member- Secretary, DVRRC

Copy to :

1. The PPS to Member (RM), CWC and Chairman, DVRRC, Room 212(S), Sewa Bhawan, Rama Krishna Puram, New Delhi – 110066
2. Chief Engineer (West), Irrigation & Waterways Directorate, Government of West Bengal, Kanainatsal, P.O. Sripally, Burdwan West Bengal 713103.
3. The Chief Engineer (Civil), Damodar Valley Corporation, Maithon.
4. The Dy. Chief Engineer (Civil)/ Manager Reservoir Operation, Damodar Valley Corporation, Maithon.
5. The Executive Director, West Bengal Industrial Development Corporation, Protiti, 23 Abanindranath Tagore Sarani Kolkata 700016.

एरिया नंबर 2

मैथन डैम - 726207

दूरभाष: 06540-274214

ई मेल: sehocmaithon-cwc@gov.in

★ जल संरक्षण-सुरक्षित अविषय ★



Area No 2,

Maithon Dam-826207

Tel: 06540-274214

E-mail: sehocmaithon-cwc@gov.in

★ Conserve Water- Save Life ★



হস্ত প্রদত্ত
HAND DELIVERY

Tel No: 933 2355 7061/7062
FAX: 933 2355 2179

**DAMODAR VALLEY CORPORATION
COMMERCIAL DEPARTMENT
DVC TOWERS; V. I. P. ROAD
KOLKATA: 700054.**

No: Coml/CD/AIC Iron/Panchet - 4773

Date: 4 MAR 2013

To
The Director
M/s AIC Iron Industries Pvt. Limited.
25 Ganesh Chandra Avenue.
4th Floor
Kolkata-700013

Sub: Enhancement of Contract demand from existing 4.1 MVA to 6.1 MVA

- Ref: 1) Your Letter vide no. nil dated 31-01-12
2) Your Letter vide no. nil dated 24-07-12
3) Our letter vide no. Coml/CD/AIC Iron/Panchet-3978 dated 02-01-2013
4) Our letter vide no. Coml/CD/AIC Iron/Panchet-4044 dated 07-01-2013

Dear Sir,

As requested vide your letter dated 24-07-2012 under reference, contract demand in respect of M/s AIC Iron Industries Pvt. Limited from Panchet Hydel Station point of supply is hereby revised from existing 4.1 MVA to **6.1 MVA at 33KV level** with effect from **00:00 hrs of 05-03-2013**. The permission for the enhancement of CD is subject to the maintenance of LC of required amount by you.

This letter modifying the Contract Demand in all purposes will form an integral part of Power Supply Agreement signed between DVC and M/s AIC Iron Industries Pvt. Limited.

Yours faithfully,

Deputy Chief Engineer (Commercial)

CC

- 1) The Director (Commercial), DVC, Kolkata- For information
- 2) The Chief Engineer(Trans), DVC, Maithon.-
- 3) The Chief Engineer, CTC, DVC, Maithon -He is requested to ensure the proper metering CT ratio for this enhancement of CD from existing 4.1 MVA to 6.1 MVA
- 4) The Chief Engineer(PSR), DVC, Kolkata
- 5) The Chief Engineer(CLD), DVC, Maithon
- 6) The DCE (M), Panchet Hydel Station, Panchet.
- 7) The Superintending Engineer(E) & H.O.O. Commercial Department -For record.
- 8) The JFA (Commercial), Commercial Department, DVC, Kolkata

TABLE: - I
Onsite Ambient Air Quality Monitoring Results
Location: Near Project Site(Benipur)
(Period: March, 2023 TO May, 2023)

DATE	PM10 (µg/m3)	PM2.5 (µg/m3)	SO2 (µg/m3)	NO2 (µg/m3)
02.03.2023	78	37	13	30
06.03.2023	66	30	16	22
09.03.2023	71	33	14	25
13.03.2023	80	38	10	23
16.03.2023	74	33	12	20
20.03.2023	82	39	11	27
23.03.2023	70	34	9	30
27.03.2023	78	36	13	25
30.03.2023	65	30	10	31
03.04.2023	75	36	9	23
06.04.2023	67	31	12	28
10.04.2023	81	37	11	25
13.04.2023	76	36	14	23
17.04.2023	83	40	16	21
20.04.2023	65	30	10	26
24.04.2023	71	33	12	29
27.04.2023	84	41	9	36
02.05.2023	74	34	14	33
04.05.2023	80	38	10	22
08.05.2023	68	31	12	24
11.05.2023	81	39	9	28
15.05.2023	76	36	11	23
18.05.2023	73	34	13	29
22.05.2023	67	31	9	21
25.05.2023	84	41	12	19
29.05.2023	70	33	15	26

TABLE: - 2
Onsite Ambient Air Quality Monitoring Results
Location: |Keliyasota
(Period: March, 2023 TO May, 2023)

DATE	PM10 (µg/m3)	PM2.5 (µg/m3)	SO2 (µg/m3)	NO2 (µg/m3)
02.03.2023	69	32	11	14
06.03.2023	64	28	6	18
09.03.2023	59	21	5	22
13.03.2023	51	17	9	17
16.03.2023	65	24	7	20
20.03.2023	68	30	10	13
23.03.2023	61	26	8	16
27.03.2023	52	18	9	24
30.03.2023	65	25	5	19
03.04.2023	70	32	6	14
06.04.2023	60	26	5	17
10.04.2023	55	20	6	20
13.04.2023	61	26	10	14
17.04.2023	74	34	8	18
20.04.2023	59	23	7	22
24.04.2023	63	27	9	17
27.04.2023	56	21	6	23
02.05.2023	64	29	10	18
04.05.2023	67	31	5	13
08.05.2023	72	33	7	20
11.05.2023	56	20	11	15
15.05.2023	65	28	8	24
18.05.2023	57	22	10	17
22.05.2023	73	33	5	14
25.05.2023	60	27	10	22
29.05.2023	67	28	7	19

TABLE: - 3 Onsite Ambient Air Quality Monitoring Results Location: Tiltorya (Period: March, 2023 TO May, 2023)
--

DATE	PM10 (µg/m3)	PM2.5 (µg/m3)	SO2 (µg/m3)	NO2 (µg/m3)
02.03.2023	59	23	7	20
06.03.2023	67	29	6	16
09.03.2023	62	24	9	19
13.03.2023	70	34	10	15
16.03.2023	57	21	7	21
20.03.2023	66	29	9	25
23.03.2023	74	36	8	17
27.03.2023	60	25	10	26
30.03.2023	65	29	8	21
03.04.2023	70	33	7	18
06.04.2023	59	21	6	25
10.04.2023	67	30	9	16
13.04.2023	62	25	7	20
17.04.2023	57	22	6	17
20.04.2023	65	29	10	21
24.04.2023	72	35	8	25
27.04.2023	60	26	6	15
02.05.2023	67	31	9	23
04.05.2023	58	22	10	19
08.05.2023	78	38	13	22
11.05.2023	69	32	8	15
15.05.2023	62	29	6	19
18.05.2023	56	21	7	16
22.05.2023	71	34	9	23
25.05.2023	59	25	8	16
29.05.2023	67	31	12	20

TABLE: - 4

Onsite Ambient Air Quality Monitoring Results**Location:** | Madandi, Harmadih**(Period: March, 2023 TO May, 2023)**

DATE	PM10 (µg/m3)	PM2.5 (µg/m3)	SO2 (µg/m3)	NO2
				(µg/m3)
02.03.2023	83	40	13	26
06.03.2023	74	35	12	29
09.03.2023	65	30	15	25
13.03.2023	87	43	11	27
16.03.2023	77	36	14	31
20.03.2023	68	31	16	24
23.03.2023	87	43	11	21
27.03.2023	80	38	12	29
30.03.2023	70	32	13	33
03.04.2023	76	36	12	27
06.04.2023	87	46	17	31
10.04.2023	74	35	15	25
13.04.2023	63	28	11	33
17.04.2023	78	39	14	30
20.04.2023	81	41	16	27
24.04.2023	73	36	12	33
27.04.2023	69	32	14	28
02.05.2023	75	36	12	31
04.05.2023	87	44	13	27
08.05.2023	67	31	14	29
11.05.2023	86	42	13	25
15.05.2023	64	29	12	29
18.05.2023	73	36	13	33
22.05.2023	84	40	17	28
25.05.2023	87	46	16	24
29.05.2023	78	37	15	30

TABLE: - 5
Onsite Ambient Air Quality Monitoring Results
Location: |Goaladi
(Period: March, 2023 TO May, 2023)

DATE	PM10 (µg/m3)	PM2.5 (µg/m3)	SO2 (µg/m3)	NO2 (µg/m3)
03.03.2023	83	39	9	17
07.03.2023	71	33	6	21
10.03.2023	63	28	8	13
14.03.2023	79	38	11	18
17.03.2023	65	30	10	16
21.03.2023	70	33	9	19
24.03.2023	78	37	10	13
28.03.2023	72	33	6	16
31.03.2023	62	28	8	20
04.04.2023	70	34	7	12
07.04.2023	61	27	11	15
11.04.2023	69	32	9	20
14.04.2023	64	29	7	16
18.04.2023	71	34	10	19
21.04.2023	83	40	8	21
25.04.2023	67	29	11	15
28.04.2023	79	37	12	18
03.05.2023	60	27	9	23
05.05.2023	74	34	12	16
09.05.2023	66	30	10	20
12.05.2023	77	36	8	17
16.05.2023	69	32	11	22
19.05.2023	65	29	12	14
23.05.2023	79	38	10	17
26.05.2023	83	40	9	20
30.05.2023	67	31	12	13

TABLE: - 6
Onsite Ambient Air Quality Monitoring Results
Location: |Asanbani
(Period: March, 2023 TO May, 2023)

DATE	PM10 (µg/m3)	PM2.5 (µg/m3)	SO2 (µg/m3)	NO2 (µg/m3)
03.03.2023	54	18	8	20
07.03.2023	70	32	7	25
10.03.2023	63	26	9	30
14.03.2023	66	30	11	17
17.03.2023	75	35	7	22
21.03.2023	63	28	8	29
24.03.2023	67	30	11	21
28.03.2023	56	20	8	32
31.03.2023	69	32	10	19
04.04.2023	75	34	8	26
07.04.2023	60	25	9	21
11.04.2023	69	30	10	27
14.04.2023	73	34	8	25
18.04.2023	63	27	9	30
21.04.2023	67	30	10	23
25.04.2023	62	26	11	27
28.04.2023	75	35	8	24
03.05.2023	66	29	11	31
05.05.2023	74	33	9	20
09.05.2023	69	30	13	26
12.05.2023	61	23	11	19
16.05.2023	72	32	12	28
19.05.2023	67	29	10	25
23.05.2023	64	27	9	24
26.05.2023	75	34	13	27
30.05.2023	60	25	11	32

TABLE: - 7
Onsite Ambient Air Quality Monitoring Results
Location: | Saltore
(Period: March, 2023 TO May, 2023)

DATE	PM10 (µg/m3)	PM2.5 (µg/m3)	SO2 (µg/m3)	NO2 (µg/m3)
03.03.2023	80	37	11	25
07.03.2023	66	29	10	32
10.03.2023	72	32	9	30
14.03.2023	62	26	12	33
17.03.2023	80	31	9	25
21.03.2023	59	23	11	35
24.03.2023	72	33	11	30
28.03.2023	70	29	10	26
31.03.2023	74	33	8	31
04.04.2023	67	26	9	27
07.04.2023	60	23	10	29
11.04.2023	67	28	11	32
14.04.2023	70	31	9	30
18.04.2023	60	24	11	28
21.04.2023	65	27	10	25
25.04.2023	78	36	11	29
28.04.2023	64	26	10	34
03.05.2023	72	31	9	32
05.05.2023	82	36	11	27
09.05.2023	75	31	11	33
12.05.2023	67	27	10	24
16.05.2023	61	27	8	20
19.05.2023	69	27	9	26
23.05.2023	75	32	10	29
26.05.2023	72	31	11	33
30.05.2023	64	26	9	25

TABLE: - 8

Onsite Ambient Air Quality Monitoring Results**Location:** Deiliya**(Period: March, 2023 TO May, 2023)**

DATE	PM10 (µg/m3)	PM2.5 (µg/m3)	SO2 (µg/m3)	NO2
				(µg/m3)
03.03.2023	70	32	6	15
07.03.2023	58	26	8	21
10.03.2023	68	31	5	19
14.03.2023	63	28	4	24
17.03.2023	59	25	6	16
21.03.2023	70	32	8	18
24.03.2023	65	29	7	14
28.03.2023	57	22	9	21
31.03.2023	70	33	6	16
04.04.2023	60	23	5	24
07.04.2023	63	26	7	14
11.04.2023	70	30	8	25
14.04.2023	65	26	6	15
18.04.2023	59	21	7	18
21.04.2023	71	31	4	16
25.04.2023	66	26	8	23
28.04.2023	70	32	7	19
03.05.2023	60	21	8	24
05.05.2023	67	30	9	14
09.05.2023	64	26	7	17
12.05.2023	60	20	6	22
16.05.2023	70	29	9	15
19.05.2023	67	26	5	19
23.05.2023	58	25	8	14
26.05.2023	61	23	4	23
30.05.2023	70	27	7	16

TABLE: - I Onsite Ambient Air Quality Monitoring Results Location Near Project Site (Period: March, 2023 TO May, 2023)			
Carbon Monoxide (CO)			
DATE	Shit - 1	Shift-II	Shift-III
	(mg/m3)	(mg/m3)	(mg/m3)
02.03.2023	0.221	0.385	0.249
06.03.2023	0.378	0.225	0.506
09.03.2023	0.760	0.652	0.345
13.03.2023	0.245	0.334	0.493
16.03.2023	0.673	0.637	0.701
20.03.2023	0.421	0.267	0.152
23.03.2023	0.343	0.734	0.731
27.03.2023	0.588	0.576	0.535
30.03.2023	0.426	0.369	0.368
03.04.2023	0.491	0.537	0.522
06.04.2023	0.230	0.721	0.618
10.04.2023	0.571	0.559	0.318
13.04.2023	0.241	0.403	0.624
17.04.2023	0.437	0.510	0.475
20.04.2023	0.404	0.424	0.599
24.04.2023	0.169	0.684	0.523
27.04.2023	0.447	0.537	0.385
02.05.2023	0.428	0.777	0.592
04.05.2023	0.404	0.360	0.399
08.05.2023	0.269	0.484	0.323
11.05.2023	0.447	0.577	0.385
15.05.2023	0.671	0.418	0.199
18.05.2023	0.573	0.637	0.401
22.05.2023	0.241	0.303	0.624
25.05.2023	0.647	0.739	0.332
29.05.2023	0.544	0.174	0.286

TABLE: - 2
Onsite Ambient Air Quality Monitoring Results
Location | Keliyasota
(Period: March, 2023 TO May, 2023)

DATE	Shit - 1	Shift-II	Shift-III
	(mg/m3)	(mg/m3)	(mg/m3)
02.03.2023	0.288	0.214	0.327
06.03.2023	0.324	0.325	0.287
09.03.2023	0.502	0.176	0.465
13.03.2023	0.197	0.490	0.181
16.03.2023	0.255	0.281	0.334
20.03.2023	0.164	0.577	0.527
23.03.2023	0.381	0.265	0.344
27.03.2023	0.297	0.356	0.251
30.03.2023	0.438	0.261	0.318
03.04.2023	0.308	0.372	0.223
06.04.2023	0.503	0.586	0.469
10.04.2023	0.430	0.317	0.250
13.04.2023	0.536	0.533	0.158
17.04.2023	0.331	0.326	0.376
20.04.2023	0.174	0.506	0.489
24.04.2023	0.313	0.218	0.343
27.04.2023	0.200	0.352	0.389
02.05.2023	0.415	0.542	0.488
04.05.2023	0.559	0.264	0.564
08.05.2023	0.149	0.238	0.308
11.05.2023	0.300	0.352	0.389
15.05.2023	0.515	0.542	0.224
18.05.2023	0.259	0.343	0.464
22.05.2023	0.158	0.595	0.201
25.05.2023	0.388	0.395	0.402
29.05.2023	0.423	0.452	0.343

TABLE: - 3 Onsite Ambient Air Quality Monitoring Results Location Tiltorya (Period: March, 2023 TO May, 2023)
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DATE	Shit - 1	Shift-II	Shift-III
	(mg/m3)	(mg/m3)	(mg/m3)
02.03.2023	0.292	0.570	0.485
06.03.2023	0.172	0.234	0.681
09.03.2023	0.210	0.274	0.558
13.03.2023	0.603	0.674	0.480
16.03.2023	0.214	0.760	0.275
20.03.2023	0.622	0.351	0.196
23.03.2023	0.426	0.616	0.722
27.03.2023	0.526	0.238	0.596
30.03.2023	0.204	0.437	0.243
03.04.2023	0.343	0.482	0.595
06.04.2023	0.362	0.359	0.260
10.04.2023	0.405	0.547	0.382
13.04.2023	0.583	0.643	0.631
17.04.2023	0.176	0.396	0.329
20.04.2023	0.640	0.699	0.710
24.04.2023	0.491	0.481	0.389
27.04.2023	0.348	0.245	0.212
02.05.2023	0.621	0.621	0.405
04.05.2023	0.414	0.430	0.258
08.05.2023	0.675	0.709	0.311
11.05.2023	0.618	0.634	0.685
15.05.2023	0.196	0.455	0.332
18.05.2023	0.559	0.575	0.724
22.05.2023	0.622	0.581	0.598
25.05.2023	0.491	0.681	0.389
29.05.2023	0.553	0.186	0.313

TABLE: - 4

Onsite Ambient Air Quality Monitoring Results
Location | **Madandi, Harmadih**
(Period: March, 2023 TO May, 2023)

DATE	Shit - 1	Shift-II	Shift-III
	(mg/m3)	(mg/m3)	(mg/m3)
02.03.2023	0.687	0.694	0.630
06.03.2023	0.947	0.325	0.490
09.03.2023	0.383	0.330	0.345
13.03.2023	0.825	0.545	0.684
16.03.2023	0.262	0.357	0.305
20.03.2023	0.938	0.981	0.813
23.03.2023	0.660	0.751	0.562
27.03.2023	0.374	0.369	0.299
30.03.2023	0.719	0.796	0.565
03.04.2023	0.245	0.597	0.548
06.04.2023	0.820	0.939	0.682
10.04.2023	0.335	0.929	0.281
13.04.2023	0.641	0.818	0.597
17.04.2023	0.457	0.334	0.903
20.04.2023	0.318	0.601	0.257
24.04.2023	0.759	0.560	0.476
27.04.2023	0.301	0.505	0.264
02.05.2023	0.603	0.807	0.556
04.05.2023	0.245	0.762	0.523
08.05.2023	0.318	0.501	0.457
11.05.2023	0.759	0.660	0.276
15.05.2023	0.301	0.605	0.464
18.05.2023	0.783	0.947	0.724
22.05.2023	0.262	0.357	0.305
25.05.2023	0.759	0.560	0.376
29.05.2023	0.487	0.607	0.746

TABLE: - 5
Onsite Ambient Air Quality Monitoring Results
Location | Goaladi
(Period: March, 2023 TO May, 2023)

DATE	Shit - 1	Shift-II	Shift-III
	(mg/m3)	(mg/m3)	(mg/m3)
03.03.2023	0.294	0.261	0.417
07.03.2023	0.255	0.222	0.447
10.03.2023	0.798	0.765	0.316
14.03.2023	0.476	0.443	0.668
17.03.2023	0.639	0.806	0.199
21.03.2023	0.533	0.500	0.747
24.03.2023	0.572	0.539	0.643
28.03.2023	0.294	0.261	0.417
31.03.2023	0.480	0.447	0.554
04.04.2023	0.183	0.650	0.316
07.04.2023	0.394	0.361	0.511
11.04.2023	0.768	0.735	0.328
14.04.2023	0.277	0.244	0.358
18.04.2023	0.220	0.187	0.205
21.04.2023	0.384	0.351	0.579
25.04.2023	0.544	0.861	0.252
28.04.2023	0.768	0.735	0.465
03.05.2023	0.185	0.452	0.781
05.05.2023	0.277	0.244	0.365
09.05.2023	0.366	0.333	0.291
12.05.2023	0.179	0.456	0.455
16.05.2023	0.259	0.226	0.340
19.05.2023	0.381	0.348	0.414
23.05.2023	0.487	0.454	0.643
26.05.2023	0.187	0.354	0.579
30.05.2023	0.761	0.728	0.344

TABLE: - 6
Onsite Ambient Air Quality Monitoring Results
Location | Asanbani
(Period: March, 2023 TO May, 2023)

DATE	Shit - 1	Shift-II	Shift-III
	(mg/m3)	(mg/m3)	(mg/m3)
03.03.2023	0.516	0.228	0.380
07.03.2023	0.636	0.431	0.510
10.03.2023	0.401	0.309	0.190
14.03.2023	0.292	0.239	0.185
17.03.2023	0.359	0.524	0.364
21.03.2023	0.552	0.173	0.236
24.03.2023	0.296	0.646	0.481
28.03.2023	0.320	0.346	0.303
31.03.2023	0.545	0.222	0.330
04.04.2023	0.169	0.595	0.509
07.04.2023	0.320	0.718	0.241
11.04.2023	0.209	0.377	0.332
14.04.2023	0.485	0.497	0.231
18.04.2023	0.197	0.428	0.176
21.04.2023	0.332	0.411	0.595
25.04.2023	0.356	0.219	0.446
28.04.2023	0.201	0.439	0.336
03.05.2023	0.227	0.270	0.390
05.05.2023	0.332	0.381	0.295
09.05.2023	0.356	0.499	0.386
12.05.2023	0.201	0.260	0.236
16.05.2023	0.600	0.395	0.664
19.05.2023	0.204	0.626	0.460
23.05.2023	0.509	0.217	0.632
26.05.2023	0.356	0.519	0.446
30.05.2023	0.576	0.213	0.256

TABLE: - 7 Onsite Ambient Air Quality Monitoring Results Location Saltore (Period: March, 2023 TO May, 2023)

DATE	Shit - 1	Shift-II	Shift-III
	(mg/m3)	(mg/m3)	(mg/m3)
03.03.2023	0.242	0.264	0.472
07.03.2023	0.390	0.541	0.311
10.03.2023	0.234	0.240	0.276
14.03.2023	0.385	0.394	0.190
17.03.2023	0.234	0.327	0.183
21.03.2023	0.434	0.484	0.358
24.03.2023	0.247	0.238	0.173
28.03.2023	0.514	0.433	0.420
31.03.2023	0.473	0.585	0.281
04.04.2023	0.195	0.174	0.519
07.04.2023	0.499	0.625	0.386
11.04.2023	0.247	0.267	0.255
14.04.2023	0.165	0.403	0.279
18.04.2023	0.241	0.178	0.475
21.04.2023	0.446	0.398	0.262
25.04.2023	0.307	0.259	0.309
28.04.2023	0.421	0.183	0.422
03.05.2023	0.315	0.403	0.395
05.05.2023	0.241	0.218	0.272
09.05.2023	0.446	0.398	0.361
12.05.2023	0.363	0.187	0.525
16.05.2023	0.214	0.396	0.166
19.05.2023	0.366	0.292	0.371
23.05.2023	0.199	0.525	0.386
26.05.2023	0.231	0.398	0.262
30.05.2023	0.313	0.222	0.168

TABLE: - 8

Onsite Ambient Air Quality Monitoring Results**Location** Deiliya**(Period: March, 2023 TO May, 2023)**

DATE	Shit - 1	Shift-II	Shift-III
	(mg/m3)	(mg/m3)	(mg/m3)
03.03.2023	0.654	0.664	0.309
07.03.2023	0.523	0.578	0.435
10.03.2023	0.173	0.625	0.644
14.03.2023	0.240	0.267	0.395
17.03.2023	0.607	0.616	0.165
21.03.2023	0.470	0.596	0.657
24.03.2023	0.308	0.456	0.383
28.03.2023	0.447	0.373	0.505
31.03.2023	0.635	0.514	0.693
04.04.2023	0.536	0.180	0.551
07.04.2023	0.295	0.193	0.339
11.04.2023	0.544	0.370	0.502
14.04.2023	0.381	0.417	0.446
18.04.2023	0.448	0.329	0.370
21.04.2023	0.394	0.772	0.405
25.04.2023	0.208	0.473	0.285
28.04.2023	0.510	0.546	0.575
03.05.2023	0.627	0.180	0.392
05.05.2023	0.381	0.417	0.446
09.05.2023	0.448	0.329	0.370
12.05.2023	0.445	0.755	0.200
16.05.2023	0.382	0.587	0.644
19.05.2023	0.511	0.193	0.482
23.05.2023	0.346	0.456	0.185
26.05.2023	0.544	0.280	0.392
30.05.2023	0.288	0.737	0.265

Table-1
Tolerance Limits for Inland Surface Waters (as per IS:2296)

SN	Parameter and Unit	Class-A	Class-B	Class-C	Class-D	Class-E
1	Colour (Hazen Units)	10	300	300	-	-
2	Odour	Unobject	-	-	-	-
3	Taste	Tasteless	-	-	-	-
4	pH (max) (min:6.5)	8.5	8.5	8.5	8.5	8.5
5	Conductivity (25°C) (μmhos/cm)	-	-	-	1000	2250
6	DO (mg/L)(min)	6	5	4	4	-
7	BOD (3 days at 27°C) (mg/L)	2	3	3	-	-
8	Total Coliforms (MPN/100 mL)	50	500	5000	-	-
9	TDS (mg/L)	500	-	1500	-	2100
10	Oil and Grease (mg/L)	-	-	0.1	0.1	-
11	Mineral Oil (mg/L)	0.01	-	-	-	-
12	Free Carbon Dioxide (mg/L CO ₂)	-	-	-	6	-
13	Free Ammonia (mg/L as N)	-	-	-	1.2	-
14	Cyanide (mg/L as CN)	0.05	0.05	0.05	-	-
15	Phenol (mg/L C ₆ H ₅ OH)	0.002	0.005	0.005	-	-
16	Total Hardness (mg/L as CaCO ₃)	300	-	-	-	-
17	Chloride (mg/L as Cl)	250	-	600	-	600
18	Sulphate (mg/L as SO ₄)	400	-	400	-	1000
19	Nitrate (mg/L as NO ₃)	20	-	50	-	-
20	Fluoride (mg/L as F)	1.5	1.5	1.5	-	-
21	Calcium (mg/L as Ca)	80	-	-	-	-
22	Magnesium (mg/L as Mg)	24.4	-	-	-	-
23	Copper (mg/L as Cu)	1.5	-	1.5	-	-
24	Iron (mg/L as Fe)	0.3	-	50	-	-
25	Manganese (mg/L as Mn)	0.5	-	-	-	-
26	Zinc (mg/L as Zn)	15	-	15	-	-
27	Boron (mg/L as B)	-	-	-	-	2
28	Barium (mg/L as Ba)	1	-	-	-	-
29	Silver (mg/L as Ag)	0.05	-	-	-	-
30	Arsenic (mg/L as As)	0.05	0.2	0.2	-	-
31	Mercury (mg/L as Hg)	0.001	-	-	-	-
32	Lead (mg/L as Pb)	0.1	-	0.1	-	-
33	Cadmium (mg/L as Cd)	0.01	-	0.01	-	-
34	Chromium (VI) (mg/L as Cr)	0.05	0.05	0.05	-	-
35	Selenium (mg/L as Se)	0.01	-	0.05	-	-
36	Anionic Detergents (mg/L MBAS)	0.2	1	1	-	-
37	PAH (mg/L)	0.2	-	-	-	-
38	Pesticides (μg/L)	Absent	-	-	-	-
39	Insecticides (mg/L)	-	-	Absent	-	-
40	Alpha Emitters (10 ⁻⁶ μc/mL)	0.001	0.001	0.001	0.001	0.001
41	Beta Emitters (10 ⁻⁶ μc/mL)	0.01	0.01	0.01	0.01	0.01
42	Percent Sodium (%)	-	-	-	-	60
43	Sodium Absorption Ratio	-	-	-	-	26

Class-A: Drinking water source without conventional treatment but after disinfection.

Class-B: Outdoor bathing.

Class-C: Drinking water source with conventional treatment followed by disinfection.

Class-D: Fish culture and wild life propagation.

Class-E: Irrigation, industrial cooling and controlled waste disposal.

Table-2
Drinking Water Quality Standards (as per IS:10500)

Sl No	Parameter and Unit	Desirable Limit	Permissible Limit in Absence of Alternate Source
1	Colour (Hazen units)	5	25
2	Odour	Unobjectionable	-
3	Taste	Agreeable	-
4	Turbidity (NTU)	5	10
5	PH	5-8.5	No relaxation
6	Total Coliforms (MPN/100 mL)	nil	-
7	Pathogenic Organisms or Virus	nil	-
8	TDS (mg/L)	500	2000
9	Mineral Oil (mg/L)	0.01	0.03
10	Free Residual Chlorine (mg/L)	0.2	-
11	Cyanide (mg/L as CN)	0.05	No relaxation
12	Phenol (mg/L C ₆ H ₅ OH)	0.001	0.002
13	Total Hardness (mg/L as CaCO ₃)	300	600
14	Total Alkalinity (mg/L as CaCO ₃)	200	600
15	Chloride (mg/L as Cl)	250	1000
16	Sulphate (mg/L as SO ₄)	200	400
17	Nitrate (mg/L as NO ₃)	45	100
18	Fluoride (mg/L as F)	1	1.5
19	Calcium (mg/L as Ca)	75	200
20	Magnesium (mg/L as Mg)	30	100
21	Copper (mg/L as Cu)	0.05	1.5
22	Iron (mg/L as Fe)	0.3	1
23	Manganese (mg/L as Mn)	0.1	0.3
24	Zinc (mg/L as Zn)	5	15
25	Boron (mg/L as B)	1	5
26	Aluminium (mg/L as AL)	0.03	0.2
27	Arsenic (mg/L as As)	0.05	No relaxation
28	Mercury (mg/L as Hg)	0.001	No relaxation
29	Lead (mg/L as Pb)	0.05	No relaxation
30	Cadmium (mg/L as Cd)	0.01	No relaxation
31	Chromium (VI) (mg/L as Cr)	0.05	No relaxation
32	Selenium (mg/L as Se)	0.01	No relaxation
33	Anionic Detergents (mg/L MBAS)	0.2	1
34	PAH (mg/L)	nil	-
35	Pesticides (µg/L)	Absent	0.001
36	Alpha Emitters (10 ⁻⁶ µc/mL)	nil	0.0001
37	Beta Emitters (10 ⁻⁶ µc/mL)	nil	0.001

Table-3
General Standards for Discharge of Effluents
[as per Environment (Protection) Rules, 1986]

Sl No	Parameter and Unit	Inland Surface Water	Public Sewers	Land for Irrigation	Marine Coastal Water
1	Temperature (°C)	#	-	-	#
2	Colour and Odour	\$	-	\$	\$
3	PH	5.5-9.0	5.5-9.0	5.5-9.0	5.5-9.0
4	BOD (3 days at 27°C) (mg/L)	30	350	100	100
5	COD (mg/L)	250	-	-	250
6	Bio-assay (% 96-hrs Survival)	@	@	@	@
7	TSS (mg/L)	100	600	200	100*
8	SS Particle size(pass IS Sieve)	850	-	-	&
9	Oil and Grease (mg/L)	10	20	10	20
10	Total Residual Chlorine (mg/L)	1	-	-	1
11	Nitrate Nitrogen (mg/L as N)	10	-	-	20
12	Ammonia Nitrogen (mg/L N)	50	50	-	50
13	Kjeldahl Nitrogen (mg/L as N)	100	-	-	100
14	Free Ammonia (mg/L as N)	5	-	-	5
15	Cyanide (mg/L as CN)	0.2	2	0.2	0.2
16	Phenol (mg/L C ₆ H ₅ OH)	1	5	-	5
17	Fluoride (mg/L as F)	2	15	-	15
18	Sulphide (mg/L as S)	2	-	-	5
19	Dissolved Phosphate (mg/L P)	5	-	-	-
20	Copper (mg/L as Cu)	3	3	-	3
21	Iron (mg/L as Fe)	3	3	-	3
22	Manganese (mg/L as Mn)	2	2	-	2
23	Zinc (mg/L as Zn)	5	15	-	15
24	Nickel (mg/L as Ni)	3	3	-	5
25	Vanadium (mg/L as V)	0.2	0.2	-	0.2
26	Arsenic (mg/L as As)	0.2	0.2	0.2	0.2
27	Mercury (mg/L as Hg)	0.01	0.01	-	0.01
28	Lead (mg/L as Pb)	0.1	1	-	1
29	Cadmium (mg/L as Cd)	2	1	-	2
30	Chromium (VI) (mg/L as Cr)	0.1	2	-	1
31	Chromium (Total) (mg/L as Cr)	2	2	-	2
32	Selenium (mg/L as Se)	0.05	0.05	-	0.05
33	Alpha Emitters (10 ⁻⁶ µc/mL)	0.1	0.1	0.01	0.1
34	Beta Emitters (10 ⁻⁶ µc/mL)	1	1	0.1	1

Shall not exceed 5°C above the receiving water temperature.

\$ All efforts should be made to remove colour and unpleasant odour as far as practicable.

@ 90% survival of fish after 96 hours in 100% effluent.

* For cooling water effluent 10% above TSS of influent.

& (a) Floatable solids 3 mm, (b) Settleable solids 850 micron.

Table-4
National Ambient Air Quality Standards

S. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air		
			Industrial, Residential, Rural and Other Area	Ecologically Sensitive Area (notified by Central Government)	Methods of Measurement
(1)	(2)	(3)	(4)	(5)	(6)
1	Sulphur Dioxide (SO ₂), µg/m ³	Annual* 24 hours**	50 80	20 80	- Improved West and Gaeke -Ultraviolet fluorescence
2	Nitrogen Dioxide (NO ₂), µg/m ³	Annual* 24 hours**	40 80	30 80	- Modified Jacob & Hochheiser (Na-Arsenite) - Chemiluminescence
3	Particulate Matter (size less than 10µm) or PM ₁₀ µg/m ³	Annual* 24 hours**	60 100	60 100	- Gravimetric - TOEM - Beta attenuation
4	Particulate Matter (size less than 2.5µm) or PM _{2.5} µg/m ³	Annual* 24 hours**	40 60	40 60	- Gravimetric - TOEM - Beta attenuation
5	Ozone (O ₃) µg/m ³	8 hours** 1 hour**	100 180	100 180	- UV photometric - Chemiluminescence - Chemical Method
6	Lead (Pb) µg/m ³	Annual* 24 hours**	0.50 1.0	0.50 1.0	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper - ED-XRF using Teflon filter
7	Carbon Monoxide (CO) mg/m ³	8 hours** 1 hour**	02 04	02 04	- Non Dispersive Infra Red (NDIR) spectroscopy
8	Ammonia (NH ₃) µg/m ³	Annual* 24 hours**	100 400	100 400	-Chemiluminescence -Indophenol blue method

(1)	(2)	(3)	(4)	(5)	(6)
9	Benzene (C ₆ H ₆) µg/m ³	Annual*	05	05	- Gas chromatography based continuous analyzer - Adsorption and Desorption followed by GC analysis
10	Benzo(a)Pyrene (BaP) - particulate phase only, ng/m ³	Annual*	01	01	- Solvent extraction followed by HPLC/GC analysis
11	Arsenic (As), ng/m ³	Annual*	06	06	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper
12	Nickel (Ni), ng/m ³	Annual*	20	20	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper

* Annual arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals.

** 24 hourly or 08 hourly or 01 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive days of monitoring.

Note. — Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limits specified above for the respective category, it shall be considered adequate reason to institute regular or continuous monitoring and further investigation.

SANT PRASAD GAUTAM, Chairman
[ADVT-III/4/184/09/Exty.]

Note: The notifications on National Ambient Air Quality Standards were published by the Central Pollution Control Board in the Gazette of India, Extraordinary vide notification No(s). S.O. 384(E), dated 11th April, 1994 and S.O. 935(E), dated 14th October, 1998.

[as per Noise Pollution (Regulation and Control) Rules, 2000]

Area Code	Category of Area	Limits in dB(A) L _{eq} *	
		Day Time	Night Time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

- Notes: 1. Day time shall mean from 6.00 a.m. to 10.00 p.m.
2. Night time shall mean from 10.00 p.m. to 6.00 a.m.
3. Silence zone is defined as an area comprising not less than 100 metres around hospitals, educational institutions and courts. The silence zones are zones which are declared as such by the competent authority.
4. Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.

- * dB(A) L_{eq} denotes the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.